COMPUTERWORLD

FOR THE COMPUTER COMMUNITY

paid at Boston, Mass., and additional mailing offices

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Price: $12/year

April 9, 1975

Vol. IX, No. 15

NEWSPAPER

Gives DPers a Choice

N.Y. DPMA Forging Certification Option

By Patrick Ward
Of the CW Staff

SYRACUSE, N.Y. – Members of New York State chapters of the Data Processing Management Association (DPMA) expect to meet here April 19 to hammer out a working proposal for state certification of DPers.

The first draft of a voluntary certification plan has already been sent to New York State DPMA chapters for their consideration.

The DPMA chapters use the term "certification" – not "licensing" – because they are talking about a way for DPers to voluntarily gain professional recognition, according to Charles E. Wright, a past president of the Niagara Frontier chapter and holder of the Certificate in Data Processing (CDP).

Wright said this voluntary aspect distinguishes the New York plan from the licensing proposal of the Society of Certified Data Processors, which would require paid consultants, for example, to hold a state license.

However, the first DPMA draft stated certification would provide "the public with a means of recognizing qualified data processors."

And the draft also said the state can demand certain DP work "that gravely affects the public's interest be managed and/or supervised by holders of certificates."

Public file processing, public DP consulting and DP systems auditing were the kinds of work mentioned.

But, these clauses have brought negative feedback from DPMA chapters "who want to make sure [certification] is strictly voluntary," Wright said.

Both Wright and Frank J. Gawronski, a fellow chapter ex-president and also a CDP holder, said that, in its present form, the draft they coauthored is only a start for DPMA debate on the subject.

Certification Requirements

Under their plan, the State Board of Regents (or a voluntary board or the State Department of Education) would grant a State Certificate in Data Processing to qualified applicants.

Certification would require a degree from a four-year college, with courses in DP, business administration, mathematics and computer science, according to the first draft.

The applicant would also have to show DP work experience for not fewer than three years with "satisfactory recommendations from his superiors that the applicant is competent to be placed in a responsible capacity in such work."

The applicant would also have to pass an examination, probably the CDP, to "show satisfactory knowledge and skill" in DP.

A final requirement called for the applicant "to submit statements from reliable persons in data processing or certificate holders that the applicant is of good character and to the best of their knowledge is capable of accepting responsibility in data processing."

Alternatives to the education and experience requirements would allow someone with two years of higher education, including DP and business administration

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Rockin' DP

Charles Grigsby, assistant curator of the New Mexico Bureau of Mines Mineralogical Museum, dusts a sample of halite, one of 9,200 rocks and minerals "fingerprinted" by an IBM 360/44 used to classify and analyze each specimen.

Ansi Solicits User Input on PL/I Standard

By Don Leavitt
Of the CW Staff

WASHINGTON, D.C. – Users have until late July to study and comment on a proposed standard for the PL/I programming language recently published by American National Standards Institute (Ansi) Committee X3 and the European Computer Manufacturers Association (Ecma).

PL/I has been described as a system-oriented language in contrast to Cobol, for example, which is essentially application-oriented. PL/I was originally introduced by IBM in 1964 and was, for some time, limited to use on CPUs from that manufacturer.

Standardization efforts got under way in 1969 and the language has been implemented on a number of mainframes in the past several years. Some of these implementations have been sponsored by the hardware vendors involved; others have been done by users, particularly in university environments.

Reactions Sought

The 400-page draft "is hard reading," admitted X3J1's chairwoman, Lois Frampton of Digital Equipment Corp. "But we need a reasonable number of comments on the language level specified" if the standard is to get through Ansi and Ecma reviews smoothly once the comment period ends, she said.

Frampton is particularly anxious to have input on the language itself and is less interested in comments on the proposed implementation. Reactions to the user-level statements and their subsidiary phrases "are the things we really want," she said.

The committee hopes users will read the document closely enough to come back and say "you don't have such-and-such a function" or "this is redundant with this." Editorial comments pointing to missing commas and similar errors are expected and will be considered, Frampton added, although prepublication reviews have already spotted what she hoped were most of the flaws of that type.

Definition of the language covered in the draft was completed in 1972. The time since then has been spent primarily in rewriting the documentation itself so it is now "significantly more rigorous and more academic in style than any other standard I've ever seen," Frampton said.

Theoretical Implementation

The book describes a theoretical implementation of the standard "or, put another way, it is an English language flowchart of the implementation," the chairwoman explained.

After an introduction and a pair of chapters defining what the programmer is allowed to write and the kinds of statements that can be used, the book drops into what happens when particular statements are specified.

This "translator" section of the manual is algorithmic in its approach. The reader considering a DO statement, for example, is led first to the section of text that describes how DO statements are compiled, the X3J1 spokeswoman said.

After that, the reader is shifted to text that describes exactly what happens when the compiled logic is executed, she added. That approach to defining a language is in marked contrast with the Cobol standard, which describes the functions and features of the nucleus and the several processing modules that make up that lan-

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Long IBM Trial Delay Called 'Disgrace' by Senate Antitruster

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – "It is a disgrace and disservice to IBM, IBM's competitors, computer users and the country at large" for the IBM antitrust case to remain in a pretrial state for seven years, according to Bernard Nash, assistant counsel to the Senate Subcommittee on Antitrust and Monopoly.

Addressing the annual meeting of the Computer Law Association, Nash said the Justice Department's case "is a good one" and he predicted the government will be successful in its charges.

But he added he was "greatly disheartened by the seeming inability or unwillingness of the Justice Department to bring the case to trial."

The recent decision of the U.S. 10th Circuit Court of Appeals to overturn the Telex decision "should not adversely affect the government's case against IBM," Nash said.

"I believe the decision to be erroneous in a number of important respects," he said. "The court's view of relative market share has no relation to the realities of the computer industry. Appearances before the Senate subcommittee clearly demonstrated IBM's market share to be somewhere between 60% and 70%."

The hearing record before the subcommittee does not support the court's conclusion that IBM derives its market position solely by superior skills, foresight and industry, Nash said, and in the matter of law, the court further erred in concluding a firm with a dominant position can deliberately use monopolistic practices if such practices would be permissible for companies which do not have a monopoly position.

Hopefully the Supreme Court will rectify certain inequitable parts of the appeals court's decision, but if the key provisions of the Denver decision are

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Battle for Control of Data Banks Still On, Hammett Tells Caravan

By Nancy French
Of the CW Staff

CLEVELAND – Even with the passage of the Privacy Act of 1974, the battle for effective regulation of data banks containing personal information is not over, Jerry Hammett, deputy director of the State of Ohio Department of Administrative Services, said here last week.

"Some people have said that with federal legislation no further action is needed, but don't believe it," Hammett told Computer Caravan attendees.

"We have made significant strides, but much remains to be done. In only a fraction of the systems does the individual have those rights which we have come to conceive of as basic for protection of privacy," he said, urging the group to commit itself to those rights.

Privacy legislation introduced at both the federal and state levels seeks to restore individual control of information to the citizen by giving him some right to participate in deciding how information about him is to be used, he noted.

Individuals give the state information it needs to conduct business in exchange for what they consider to be essential services.

But once the individual turns that information over to an agency, he loses control of it and what happens to it becomes a "whim of the state," Hammett said.

Unfortunately, over the years a lot of that data – from incomplete arrest records to health records – has ended up in credit bureau files, he noted.

"The growth of computer systems has

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THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
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Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160.
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50 cents a copy; $12 a year in the U.S.; $20 a year for Canada and PUAS; all other foreign, $36 a year. Four weeks notice required for change of address.
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Computerworld can be purchased on 35mm microfilm in half-volumes (six-month periods) through University Microfilm, Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700.

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POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Massachusetts 02160.

Problems Beset Mich. Conversion Effort

By Patrick Ward
Of the CW Staff

LANSING, Mich. – The State of Michigan has run into some problems during "the largest, most complex conversion" in the history of the state's DP use, according to Dr. John Dempsey, director of the Social Services Department.

Tape processing, primarily read/write errors, is the main source of trouble. William T. Nash said. Nash is director of the department's Health and Welfare Data Center, where two Honeywell 60/80 systems are due to replace three Univac 70/6s by July 1.

"We have had what I consider an inordinate number of tape processing problems," Nash said. "You name it and we've had it."

However, it was plain "human error," and not read/write problems, that caused Michigan to spend an extra $144,000 on its Aid to Dependent Children (ADC) program between Feb. 12 and March 10, Nash said.

Scheduling people failed to transfer 1,240 ADC grant reductions or closures from one master tape to another used for check printing, he explained. The same kind of error delayed processing of 418 ADC grant increases, he said.

The data center has applied tighter controls to guard against reoccurrences, he added.

Conversion Going Well

Despite the problems with the tape drives, "the hardware conversion is going reasonably well," Dempsey told Gov. William Milliken. "It would have been surprising if there were no problems," he added.

The two 60/80s currently have 393K words of core between them and run under Gcos Version G1. Peripherals include 27 DSU 190B disk drives and 36 MTH 505 tape drives.

The tape-processing troubles threatened to delay mailing of ADC biweekly payrolls in early March, "but by adjusting priorities, the ADC payroll did not slip," Dempsey wrote the governor.

Similar tape problems have usually kept Medicaid weekly invoice-payment cycles one to five days late, Dempsey stated.

Problems Resolved

However, both Dempsey and Nash now feel the Health and Welfare Data Center has resolved its tape-processing problems.

Another problem, now apparently solved, led the system to put blanks where there should not have been blanks, including the amount field in 19 ADC checks.

Caseworkers used Michigan's on-line Client Information System (CIS) to quickly find out what the ADC recipients were entitled to, Nash said.

In spite of these difficulties, Dempsey stated he was "confident the July 1 conversion target will be met, with the possible exception of the CIS system.

"Should slippage occur, the contractual penalties imposed on Honeywell will more than offset any out-of-pocket expenditures by the state of Michigan for rental of Univac systems beyond July 1," Dempsey concluded.

Lord Ready to Powwow

HUDSON, Mass. – Kenniston W. Lord Jr., president of the Society of Certified Data Processors (SCDP) has requested a "war council" with the leaders of other professional societies while they are at the National Computer Conference in May.

"I don't think it's necessary . . . to tell you that we have interests in the licensing of data processing people and of the social implications of the systems we use," Lord said in a letter to the presidents and chairmen of 14 professional societies.

The SCDP feels "the ultimate issue . . . is not licensing specifically, but rather the formation of a commonly accepted practice, or what we have been terming a 'Uniform Code for Data Processing Practice'," he said.

The "war council" will be a forum to discuss what it takes to pursue such a complex set of issues, Lord wrote the society officials.

The only response so far has been from the Association for Computing Machinery, which said it wouldn't come.

Mass. 'Thumbs Down' Licensing

BOSTON – A proposed bill to license DPers in Massachusetts "ought not to pass," according to the decision of the Government Regulatory Committee of the Massachusetts Legislature.

Such a committee report usually dooms a bill, noted Rep. J. Michael Ruane (D-Salem). This is especially likely in this case, he said, since no committee member is in favor of the licensing proposal.

Based on a proposed licensing law the Society of Certified Data Processors (SCDP) has sent to each of the 50 states [CW, Dec. 11], the Massachusetts legislation calls for the establishment of a Board of Registration of Professionel Data Processors which would license and register a top-level stratum of "Licensed Professional Data Processors."

But committee members decided a DP licensing law "would present many difficulties." Their decision was based on testimony given at a hearing on the bill [CW, Feb. 19], Ruane noted.

While passage of a licensing law now appears unlikely in Massachusetts, Pennsylvania Rep. James Whelan Jr. (R-Cambria) said he plans to introduce a similar bill into that state's legislature.

N.Y. DPMA Forging Certification Option

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courses, to qualify with five years of DP work experience. A high school graduate with 10 years of DP work could also qualify.

Under the first draft, certification could be revoked any time the holder violated the Code of Ethics, which is borrowed from the CDP exam, Wright said.

However, the DPMA draft added the certificate could be revoked "any time a holder cannot prove that within any year he has not actively participated in a data processing seminar or attended a one-week data processing seminar or successfully completed a course in deta processing at an approved college."

Several New York State Association for Computing Machinery chapters have asked to participate in the April 19 meeting, Wright said.

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Battle for Control of Data Banks Still Being Waged: Hammett

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placed the state governments in a kind of Jekyll and Hyde role," Hammett said.

"On the one hand, such institutions are among the largest collectors of personal information and, on the other, the leading privacy advocates," he said.

To the disappointment of 20th Century soothsayers who foresaw the computer as the personal genie inside Aladdin's lamp, the computer has become, instead, "the tool of large institutions," he added.

Rather than serving the individual with such things as safe, automated highways and motor vehicles and foolproof mate selction, the computer has come to symbolize the institutions that dominate our society and provide our services, Hammett stated.

State governments are now responsible for vast amounts of information, according to Hammett – from drivers' licenses and motor vehicle records to student loans, tax returns and even information about people's vital statistics.

As Peter Drucker, an expert in business administration, once pointed out, "the computer is merely the mechanical expression of the organizational fact. Organizations operate on information and, therefore, always try to gather as much as they can," Hammett said.

Legislative efforts to correct this problem "span the decade," Hammett noted, and common to all laws introduced to date are the concepts of "prior informed consent of the individual before disseminating that person's file; public notice of the existence of data banks of personal information; and the right to access and correct records that are believed inaccurate," he said.

Legislation 'Overly Simplified'

Legislation introduced following the 1973 publication of the Secretary of Health, Education and Welfare's report on privacy provided "overly simplified answers to complex problems," according to Hammett.

"Hailed at the beginning as a kind of modern Bill of Rights," privacy legislation failed to provide solutions or was not even passed, he noted.

However, those efforts did "make the public aware of the problem of privacy as well as making the DP community more aware of the sensitivity of its work."

Minnesota passed the first significant piece of privacy legislation, Hammett said, noting it wisely applied only to the government sector.

"The regulations were new and untried," he said. "Legislators realized the state government, with more computerized records than anyone in the private sector, would be a good testing ground," he said.

The Minnesota law provides the individual with the right to know how information he supplied will be used, as well as whether he is legally required to submit such information. Further, upon request, the individual is to be informed if any government record systems contain information about him. Finally, he can contest the accuracy and completeness of those records, Hammett said.

In other state legislatures, including California and Ohio, similar bills were defeated, Hammett said.

Court Nixes Telex Petition For Rehearing in IBM Case

DENVER – The U.S. 10th Circuit Court of Appeals here has denied Telex Corp.'s petition for a rehearing in its antitrust case against IBM. The peripherals manufacturer said it will carry its case to the U.S. Supreme Court.

Telex last month asked the full, seven-judge court to review the January decision made by a three-judge panel of the appeals court which overturned a trial court finding that IBM violated the Sherman Antitrust Act [CW, March 5].

S.J. Jatras, president of Telex, said the firm was "disappointed" the decision was upheld.

"We now intend to file a petition for a writ of certiori to the Supreme Court," he stated. "We continue to have confidence in the belief this erroneous decision will not be permitted to stand."

Telex has retained Moses Lasky of San Francisco, a nationally prominent antitrust expert, to assist with its Supreme Court petition.

IBM was understandably pleased with the appeals court denial of Telex's request, a spokesman for that corporation said.

Now, unless the Supreme Court decides otherwise, the appeals court ruling that the U.S. District Court in Tulsa, Okla., erred in its award of $259.9 in damages to Telex will stand, and Telex will have to pay $18.5 million in punitive and compensatory damages to IBM for stealing trade secrets.

Ansi Asks User Input On PL/I Standard

(Continued from Page 1)

guage, basically at the user logic level.

Comments received will be shared by X3J1 and its Ecma counterpart and they hope to complete processing of the input by mid-October. If suggested changes are "fairly small," they will be discussed right away with an eye to modifying the draft before it goes to X3 for formal balloting.

If a "very large change" that is a "compatible extension of the current language definition" is suggested, it will go into a development file for consideration in connection with the next version of the standard, Frampton said.

Even though the language definition was "frozen" in 1972, the standard is "ahead of any current implementation," she added. The closest implementation is probably Honeywell's version on the Multics systems, "but even that's not full."

On the other hand, "everything in the standard has been implemented somewhere," she said.

Copies of the draft standard are available at $10 for first class mailing or $8 if shipped third class. Comments on the proposal as well as orders for the draft document (payment is required with the order) should be sent to X3 Secretary, Cbema, 1828 "L" St. NW, 20036.

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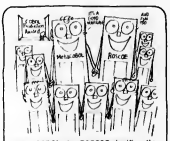

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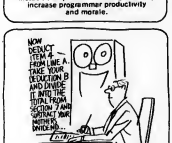

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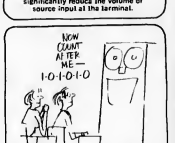

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'Outrageous Conduct' Charged

DP 'Billing Error Victims' Sue Penney for $100,000

By Catherine Arnst
Of the CW Staff

KNOXVILLE, Tenn. – J.C. Penney Co., Inc. is being sued for $100,000 because of billing errors, in two separate cases in this state.

Both plaintiffs were billed through a central computerized billing process based in Atlanta.

Robert C. Moorhead, an accountant, is suing on the basis of "outrageous conduct" for $150 compensatory damages and $100,000 punitive damages due to an alleged error of $16.78. He claimed he was charged for a returned item, rather than given credit.

In a similar case, William E. Smith of Greenville is suing for $100,000, because the store has repeatedly billed him for charges made on someone else's account.

Moorhead's problems started in August 1973, when he returned a piece of merchandise. In the following monthly bill, he received a charge rather than a credit, which he attributed to a "gross and negligent error in the computer billing procedure."

After being promised by local store employees that the error would be taken care of, Moorhead received threatening letters, and service charges were added to increase the amount.

The store attempted to correct the error, but instead doubled the amount to $38.12 and once again demanded payment.

In frustration, Moorhead closed his account and returned his credit card after mutilating it. In spite of this, he afterward was notified the company was closing his account, writing "your attitude of silence puzzles us."

In March, he began receiving notices from a collection agency about the matter. Moorhead went to see the manager of the store, who admitted an error had been made. The local branch wrote a letter to the Atlanta office beginning with the words, "we goofed." Shortly after, Moorhead again received threatening letters.

In July, J.C. Penney again admitted to an error and informed Moorhead a new account had been opened for him. But the store carried the old charge over, so he was still billed for the erroneous amount.

Moorhead had received 42 letters and bills from the company regarding this charge by December, when he decided to sue.

Credit Card Numbers Different

In Smith's case, he was informed in November 1974 that he had an overdue account with the store. The credit card number on this account was not the same as his own, however, and he had canceled checks to prove he'd paid all his bills.

Smith continued to receive calls, and by December his account was also turned over to a collection agency, which led him to file suit.

The store has refused to make any comment to *Computerworld* on either case, and has yet to reply to the suits filed against it. In the Smith case, it filed a motion of summary judgement on March 5, which the court has yet to act on.

Moorhead, however, is sure his problem was the result of a programming error.

"The system is sophisticated in some respects, but there is a general breakdown in control when correcting errors," he said.

Moorhead claimed he kept receiving positive assurances the error would be taken care of when he talked to anyone on a local level, but felt that "no one seems to be able to correct an error that occurs at a higher level."

"I finally got fed up. I felt like I was talking to a computer. I knew I was right, but I couldn't prove it to anyone," he said.

'Some Type of Computer Error'

Smith also guessed his problem was some type of computer error. "They got my address attached to someone else's bill."

He contended there is a breakdown in communications. "I kept talking to the same lady, and she said she'd take care of it. Once she called me at 8:00 a.m. on a Saturday. Now I've had it. Someone's not communicating, and it's going to cost them."

Moorhead's attorney, William Vines, said that since the case was reported in a local newspaper, he has been contacted by a number of people with similar problems.

Consumers Getting Federal Help

By a CW Staff Writer

WASHINGTON, D.C. – Billing errors, whether caused by computerized or manual systems, have long been the nemesis of the consumer's existence.

The Federal Government, however, has offered the public a legal platform from which to contest such errors by passing the Fair Credit Billing Act, an amendment tacked on to the Depository Institutions Act passed last October.

The law, which takes effect next October, stipulates procedures that both the debtor and creditor must follow when billing errors are made.

According to the law, if a person receives what he believes to be an incorrect bill, he must write the creditor within 60 days, giving both his name and account number and explaining what he thinks is incorrect.

The creditor must acknowledge the letter no later than 30 days after receiving it and must resolve the complaint, with supporting evidence supplied, within 90 days.

Until the complaint is resolved, the creditor cannot submit any disputed amount as delinquent to a credit reporting firm. If it does, it must inform the credit reporting firm that the amount is in dispute and must also notify the debtor that this information has been passed along.

In addition, the creditor may not send any letters demanding payment, threaten an adverse credit report, charge interest on the disputed amount or otherwise try to collect it until the inquiry is resolved.

If the creditor fails to comply with the law, it forfeits any right to collect the disputed amount and is subject to a fine of not more than $50.

The legislation, sponsored by Senators William Proxmire (D-Wis.) and William Brock (R-Tenn.), was passed four years after it was initially introduced to Congress.

Margaret Nelson, consumer economics specialist at the University of Wisconsin-Extension, attributed its passage to a strong consumer lobbying effort and the ever-growing number of people "computer billing" errors have afflicted.

Commerce OKs Large IBM Shipment to Russia

WASHINGTON, D.C. – The Commerce Department has given IBM "verbal" approval for the shipment of 10 System/7s, one 370/158 and related equipment and terminals to the Soviet Union – one of the largest Eastern Bloc computer orders ever to receive U.S. clearance.

The systems would be used at the Kama River auto and truck manufacturing plant, now under construction east of Moscow and expected to be one of the world's largest on completion. The System/7s are slated for production control applications and the 158 – which will be the first 370 in the USSR – will be used for management planning.

The application for export of the systems now goes to the Nato Coordinating Committee, which must rule on all such applications. Industry sources said, however, that in the past the committee generally has acted as a "rubber stamp" for applications which have cleared the Commerce Department.

The move approving the sale by Commerce is seen by some as an indication the Ford administration wishes to keep detente alive between the two nations.

In addition, it represents a continuing, albeit quiet, movement on the part of IBM toward greater trade with Eastern Bloc nations.

Just over five years ago, Thomas J. Watson Jr., then board chairman at IBM, traveled to Moscow to discuss the establishment of an IBM manufacturing plant in the USSR, but IBM decided not to go ahead with any such arrangements, primarily because of concern that there might be a negative reaction from conservative groups such as the Young Americans for Freedom in the U.S.

Long IBM Trial Wait Dubbed a 'Disgrace'

(Continued from Page 1)

upheld by the Supreme Court, Nash said he has "no question but that legislation will quickly be introduced to redefine the parameters of the Sherman Act."

There seems to be a broad resurgence for vigorous enforcement of the antitrust laws in Congress, he noted. A new bill introduced would increase appropriations to both the antitrust and Federal Trade Commission by 200% over a period of three years.

This bill has drawn 42 cosponsors in addition to the original sponsors, Senators Philip A. Hart (D-Mich.) and Hugh Scott (R-Pa.), and hearings will be held in late April or early May.

Commenting on the government's antitrust case against AT&T, Nash predicted a court decision within three years will divest Western Electric from the Bell System and will also spin off the Long Lines Department of AT&T.

Such a move will allow a large number of independent operating companies to compete, he said.

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CW-409

Price-Marking Bills Sprouting on State, U.S. Levels

By Patrick Ward
CW Washington Bureau Staff

WASHINGTON, D.C. – A federal bill requiring retail stores to mark prices on items – even though they have been stamped with the Universal Product Code (UPC) – has 55 cosponsors.

A county in New York State has already passed such a law.

And several state governments are reportedly considering similar measures.

These proposed laws may spell trouble for supermarket chains which hope to cut labor costs by doing away with price stamping and cash registers in favor of the UPC and automated checkout systems.

"I am concerned . . . that we make clear to those testing and implementing the UPC that clearly marked prices on all packages are a nonnegotiable right of all consumers," Rep. Harold E. Ford (D-Tenn.) said when he introduced the price-marking bill into the House of Representatives.

Accordingly, H.R. 4150 states that "no person who is engaged in business as a retail distributor of packaged consumer commodities . . . may sell, offer for sale or display for sale any such commodity unless its total selling price is plainly marked, by a stamp, tag or label, on the principal display panel of a label on the commodity's package."

Putting prices only on supermarket shelves – and not on the items themselves – would make the register slip the shopper's only information on product prices once he leaves the store, Ford said.

"While shopping, a consumer will be unable to make even a rough estimate of the total costs of the products being collected in his basket.

"In addition, comparison shopping from one aisle to the next or from one shopping day to another will be virtually impossible," he said.

The shopper trying to follow a checkout system as it totals up his purchases would have to "remember the shelf price of each product in the basket," Ford said, although he added some stores are providing grease pencils to customers who want to mark their own purchases before checking out.

Ford said he was not against the new technology UPC represents, nor did he doubt its efficiency.

While he noted some supermarket chains have sold price-marking laws would eliminate the incentive to go to UPC-based automated checkout systems, Ford argued an end to price marking represents only a fraction of the savings these systems can realize.

And the "basic consumer privilege" of having prices marked on items is not too high a price to pay, he added.

Cosponsors of the House bill include Democrats Bella Abzug, Shirley Chisholm and Elizabeth Holtzman, all of New York; Paul Sarbanes and Gladys Spellman of Maryland; and Floyd Hicks of Washington.

There are also four Republican cosponsors: Ronald Sarasin of Connecticut; Ben Gilman and Frank Horton of New York; and Margaret Heckler of Massachusetts.

Why such wide support for the bill?

Holtzman "just feels it is important for shoppers to have that convenience," a spokeswoman explained.

"Judging by present standards of shelf marking," stores that mark individual packages would not give the consumer "enough information to shop intelligently," Sarasin said.

While the federal bill would take effect six months after enactment, it first has to find its way through a Congress preoccupied with energy and economics.

N.Y., Washington Bills

In the meantime, Rockland County, near New York City, has already passed a law requiring food markets to put prices on the items they sell. A bill with similar intent is pending in the New York Legislature and several others.

The state of Washington has joined the list. Sen. Ruthe Ridder (D-King County) has introduced a bill (S. 2656) that would require every consumer product offered for retail sale "to bear the price in arabic numerals . . . not in code."

The Maryland House of Delegates' Committee on Economic Matters gave a favorable report to that state's price-marking bill [CW, Feb. 26], and a house vote is imminent.

Growing media coverage of the automated checkout approach generally notes that supermarkets expect to save money through tighter inventory control and lower labor costs.

Developed by IBM

Encryption Algorithm Proposed for Federal Use

WASHINGTON, D.C. – A data encryption algorithm, designed to provide a high level of security for information stored and transmitted among computer systems, has been proposed for general use in the Federal Government by the National Bureau of Standards (NBS).

Developed by IBM, the algorithm was judged most satisfactory in fulfilling NBS' requirements for use in a federal standard. It would:

- Provide a high level of protection.
- Be easy to implement.
- Serve diverse applications.
- Depend on the key rather than the secrecy of the algorithm itself for security.
- Be implemented at a reasonable cost in hardware.
- Be easily tested and validated.

The algorithm is of the "block cipher" family. It protects digital data by making it incomprehensible and, therefore, immune to disclosure or undetected tampering, according to an NBS spokesman. Decryption returns the data to its original form.

Encrypted data may be transmitted within computer networks or stored with minimal risk. Successful protection of data lies in the secrecy of the key, which is a number selected by the custodian of the data, much like a lock combination. Once data has been encrypted using a specific key, it may be decrypted only with that same key.

The NBS spokesman estimated that without the key, several hundred years' work would be required to break the code. The algorithm itself is not a secret, he pointed out.

Economical Protection

The algorithm is expected to promote economical, efficient and effective protection of private data and be useful in applications such as monetary transfer systems and the transmission of commodity information, for example.

The NBS is now circulating the proposal for agency comment. In addition, it was published in the *Federal Register* of March 17, to give industry the opportunity to comment on it or initiate its implementation, NBS said.

The algorithm was one of those submitted to NBS as a result of two solicitations for encryption algorithms in May 1973 and August 1974.

While NBS plans to publish more details on the algorithm, along with a description of possible uses, as a "technical note" available through the Government Printing Office, earlier copies may be obtained by sending a self-addressed mailing label to NBS, Department of Commerce, Technology, A-265, Washington, D.C. 20234.

IIA Project Compiling Guidelines For Accounting Firms Using DP

ORLANDO, Fla. – The Institute of Internal Auditors (IIA) has embarked on a research project to assemble and publish control and auditing guidelines for accounting organizations using computers.

The study, financed by a grant of about $500,000 from IBM, will be completed in mid-1976. Results will be published in manuals for auditing and DP professionals, as well as in a series of executive management reports.

The IIA's goal is to produce guidelines which firms can put into practice immediately at the applications level to detect and prevent errors and guard against misuse of information, according to William E. Perry, project director at the IIA. The institute will draw on its own expertise and that of the Stanford Research Institute, looking to IBM solely for financial support.

Techniques Recommended

The IIA recommends several techniques to the audit community, including the integrated test facility, Perry said. In such a procedure, the auditor acts as a user of the system, he explained.

Another technique is an independent master system, which ensures the DP systems group is different from the group that develops master records, he said.

For example, the payroll people wouldn't control the pay rate, which would be put into the system independently. This procedure should help remove the temptation to commit fraud.

During the project, Stanford Research Institute will survey thousands of organizations worldwide and conduct detailed follow-up interviews with those using advanced control and audit techniques.

A symposium to obtain the views and solicit the support of experts from the accounting and DP communities is also planned.

IIA is developing project specifications and will work with the researchers to provide auditing expertise, said Perry. It also plans to play a major role in the interpretation of data, he added.

The IIA had been planning the project long before the Equity Funding Corp. of America scandal was uncovered in Los Angeles in 1973 [CW, Apr. 18, 19731, Perry said, adding that incident certainly helped focus attention on DP auditing.

NBS Initiating Study On Copyright Query

WASHINGTON, D.C. – The question of whether a library has the right to provide patrons with the text of copyrighted documents through computerized information retrieval systems without paying royalties will be studied by the National Bureau of Standards (NBS).

Under a $150,000 grant from the National Science Foundation, the NBS Institute for Computer Sciences and Technology (ICST) will initiate an 18-month study of the impact of copyright law and economics on information technology.

ICST will investigate the impact of the nation's 66-year-old copyright law on user needs and access to computerized scientific and technical information.

It will attempt to identify and recommend legal, economical and technical alternatives that are both beneficial to both the public and copyright owners, a spokesman said.

The study will also attempt to pinpoint policy issues that are crucial to the continued availability of scientific and technical information.

Among proposals already under consideration is one for a central copyright clearinghouse for procurement of licenses and payment of royalties. To date, however, no studies have examined the feasibility of such a clearinghouse.

A central legal question, which remains unresolved, is whether or not magnetic tape used to store data constitutes a "copy" under present legal definition.

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At Health Maintenance Organization

Patient Record System Coordinates Doctors' Efforts

By Edith Holmes
Of the CW Staff

BOSTON – "Much of medicioe *is* information processing; most physicians should have greater feedback concerning their patients than they presently receive," according to Dr. G. Octo Barnett of the Laboratory of Computer Science (LCS) at Massachusetts General Hospital here.

"Data processing should not be viewed as an isolated activity within medicine; it must be measured in terms of its impact on patient care," he added.

Computers At Work In Medicine

Laboratory director of the on-line medical record system serving the Harvard Community Health Plan (HCHP), a prepaid group practice providing ambulatory care to its members in a clinical environment, Barnett considers the Computer Stored Ambulatory Record (Costar) ooe key way to alleviate the lack of coordination of information among the physicians treating a patient.

Used on a seven day/week, 24 hour/day basis, Costar "is the primary support for the information needs of both administration and medical care delivery of the health maintenance organization," he said.

Developed and implemented over the past five years, Costar makes one record available to all those treating a patient who is either enrolled or on a fee-for-service basis with the health maintenance organization.

The system operates on the priocipte that all information exists in a central patient file rather than in a single physical document, according to Barnett.

HCHP's system operates on three PDP-9s and two PDP-15s from Digital Equipment Corp. Some 18 to 20 Infoton CRTs, located in the various care areas, are on-line to these CPUs; Terminet and A.B. Dick high-speed printers also access the system from the clinic.

"What really makes the system work, though, is Mumps, the interactive programming language we use," he stated. Developed at Massachusetts General Hospital, Mumps was designed to permit quick access of individual clinical records. "We couldn't have created this system without it," Barnett said.

The system stores over 95% of the medical information generated and used in primary patient care on disk files. Information is collected by specialty oriented, self-encoded checklists; by problem-linked dictation; and by direct input in source areas such as the laboratory.

Entered within 24 hours into the computer system in a patieot record-oriented, problem-organized file structure, this information can be retrieved by HCHP's 60 physicians and 45 nurses from the CRTs located in their specific care areas, Barnett explaioed.

A partial medical record is printed by the system for distribution to the people providing health care prior to each scheduled appointment.

But however extensive or complex the routine output generated for any one of HCHP's 15 specialties may be, the computer-generated output is always a selected portion, or subset, of the complete medical record," Barnett said. "It would be economically impossible to generate the complete medical record for every visit."

He added, though, the output specifications designed by each medical specialty are flexible and may be altered.

In addition to this hard-copy medical output, the system also generates a "status report," a document produced for all scheduled visits and designed to provide a complete index to and summary of the patient's current medical status, he said.

And the provider of health care has access to any information he needs. "One of the most useful aspects of the system is the capability to obtain quickly a temporal history of any problem, laboratory datum or medication," Barnett noted.

Encounter Form

The ioformation accessed and updated by the physician is captured by completion of an encounter form, the system's basic data input document.

Clerical personnel record background information before the physician sees the patient. Medical information is captured wheo the physician or nurse checks a precoded form and adds appropriate modifiers and free text. Space is also provided to enter either diagnoses or medications, Barnett said.

The encounter form also includes coded information allowing automatic provider feedback on such activities as a patient's lab tests, his consultations with another HCHP physician and whether a follow-up visit has been scheduled, he noted.

In addition to medical information, the Costar system contains administrative data which provide the health center's management with demographic and registration information on HCHP's membership of 37,000, a means of handling Medicare bills for all patients over 65 and individual bills for fee-for-service patients, a payment mechanism for the utilization of services outside the plan's health centers, multiple types of routine statistics and mailing labels for all subscribers, Barnett said.

But perhaps "the most exciting applica-

Charles Singer, manager of patient data systems for HCHP, demonstrates how a pediatrician can obtain a hard copy of a child's status report in about three minutes if the patient comes to the clinic without an appointment. The printer is a GE Terminet 1200.

tion of the computer-stored medical record is a quality assurance program in which the computer is programmed to automatically detect deviations from provider-defined standards of care for particular diseases," Barnett said. HCHP now has two programs to evaluate the care delivered in hypertension cases and those in which a throat culture must be taken.

These programs, however, "just scratch the surface of DP's ability to really aid in the health care process," Charles Singer, manager of patient data systems, said, adding the health plan's personnel are currently working on programs to follow up women's abnormal Pap smears and child immunizations.

But the extensive amount of time required of physicians in developing these quality assurance programs makes their rapid development prohibitive, he noted.

Just as the further implementation of quality assurance will depend on the involvement of the plan's physicians, Costar was made possible only "because of a major commitment of the administration and professional staff of HCHP and many person-years of close collaboration between the HCHP and the LCS staffs," Barnett said.

Described by Barnett and Singer as "an evolving system," Costar is neither complete nor optimal and completely acceptable, they remarked. "The feasibility of the approach has not been demonstrated in any ultimate sense," Barnett noted.

Crucial areas in which the experiment "is not mature enough to allow final judgment" are:

- "Acceptability to providers of a selected, partial medical record.
- "Feasibility of achieving adequate

(Continued on Page 8)

DP Prognosis

Medicare and Medicaid legislation in the mid-60s prodded many hospitals and other health care organizations into the use of computers to handle their financial and accounting processes.

Now, laws establishing professional standards review organizations in 1972 and an impending national health insurance program indicate the medical profession could be forced into the automation of most – if not all – of its operations.

This month *Computerworld* takes a look at the use of computers in medicine. Among the topics covered are the development and evaluation of an online medical records system at a health maintenance organization, the standardization of an interactive programming language designed with the patient record in mind, the future of large, national or regional data banks as additions to the traditional range of medical libraries and experience, the funding of systems implemented to control Medicaid payments and the cost-effectiveness of a total medical information system established in a hospital setting.

Studies by various market research organizations have indicated that, despite tbh publicity it has received, medical DP trails behind most applications areas.

While the technology to develop extensive information systems for health care organizations has existed for several years, these institutions need better management if they are to keep systems costs in line with the expected benefits of automation.

Another, perhaps more important, "must" in the further development and implementation of business and clinical systems in the field is acceptance and use of computers by physicians and other health care personnel. A system stands no chance of being cost-effective if doctors and nurses refuse to use it.

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An Interactive Time-Sharing System

Medical DPers Can Find 'Mumps' Good Thing to Catch

By Edith Holmes
Of the CW Staff

BOSTON – Ever had mumps? If not – and if you are associated with a health care facility concerned with automating its medical records – you may want to consider this computer-based, interactive time-sharing system.

The Massachusetts General Hospital Utility Multiprogramming System (Mumps) was originally designed to permit direct access to the textual records found in medicine, where data is both sparse and variable in length, Martin Johnson of the National Bureau of Standards (NBS) explained.

Computers At Work In Medicine

Though intended for clinical data management, the system is now being used to handle such nonmedical data as the textually oriented inventories of parts of the transportation industry, he added.

Meeting here last month, the Mumps Development Committee (MDC), created out of the NBS and the Mumps Users' Group (MUG), completed its effort to strengthen the system and to facilitate the transfer of its application programs by adopting a "Standard Mumps." With the strong support of Mumps users, MDC and NBS have submitted Standard Mumps to the American National Standards Institute as a proposed national standard and are looking to vendors of Mumps systems and services for acceptance, Johnson noted.

Development of Mumps began "in earnest," according to Johnson, in the fall of 1967. The user group was formed in December 1972 and now has over 150 paying members.

Mumps works from the premise that the record – be it patient or otherwise – is always at the center of the system, Johnson explained.

Four basic components comprise the Mumps operating system, according to MUG. These include:

- A time-sharing executive which selects users and allocates CPU time.
- A reentrant special-purpose interpreter which executes programs in the higher level language of Mumps.
- A disk file management system which manipulates the hierarchical data base.
- An I/O system which services the other (nondisk) devices.

Because the language is interpretive, Johnson said programs can be written and modified with greater ease and speed.

In addition, the system's hierarchical data base format handles data files of varied and continually changing shape and size in a manner MUG described as "graceful."

Both Johnson and the user group pointed out the string-handling capabilities of Mumps. This ability "makes it simple for a Mumps user to check the syntax of a string, search it for any desired characters, dissemble it or add to it," MUG said.

Time-sharing permits a common, continually revised data base to be accessed by several users at the same time. And because the program storage space required by Mumps is very small, "a partitioned-core time-sharing system may be set up on a machine with a core as small as 16K (12-bit) words, providing a multiuser environment without the need for repeated swapping between core and storage devices," MUG stated.

Johnson said the majority of Mumps implementations have been accomplished on minicomputers like Digital Equipment Corp.'s PDP-9, 11 and 15 and Decsystem-10, Data General's Nova series and Hewlett-Packard's HP-3000.

He added, however, that the University of California at Davis has put Mumps in Algol on its Burroughs B6700 and that work is under way, under the auspices of the National Institute of Health, to adapt the system to IBM 360s and 370s.

Many Application Programs

Finally, the user group noted Mumps includes a large number of existing application programs. Of the 176 areas of Mumps applications, 123 are medical; 21 deal with business; 22 are general applications; and 10 are systems packages.

Some eight different dialects of Mumps are in use, and one version even has a different name, the user group noted.

Johnson considers the standards a compilation "of the best of these dialects."

Record System Aids Physicians' Efforts

(Continued from Page 7)

and uniform provider education and technical understanding of the unique aspects of Costar.

- "Demonstration that, in the long run," the necessary financial and personnel support of the computer system can be achieved without placing unacceptable demands on an organization primarily devoted to health care."

Some providers do miss the ability to "browse" through the entire medical record at their leisure, according to Barnett. But he added he suspects 75% to 80% of the physicians at HCHP are in favor of the system.

The plan's management is currently working to develop a provider attitude survey to determine more precisely what physician responses are, he said.

Because of the system is "provider-dominated," patients rarely come into contact with Costar. They may see the physician with a printed output or recognize that, when they call, the clinic responds quickly to their needs.

"But how many connect this speed of response to a computer system, I don't know," Barnett said.

The chief tasks facing Singer, Barnett and others involved with Costar are system documentation, evaluation and ensuring cost-effectiveness.

"We know we can come up with the necessary proofs of the system in operation at HCHP; Costar currently saves our members $2.50 to $3 a year over a manual record system," Barnett said.

"But so what?" he asked. "The next question is, 'Will it work elsewhere?'

"We've constructed a recordkeeping system in the generic sense," Barnett noted. "It should fit the requirements of any large health maintenance organization."

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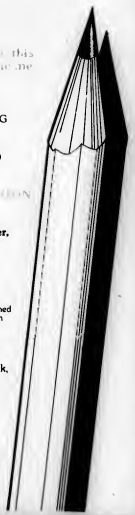

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Data Banks Extend Libraries, Experience of Physicians

By Edith Holmes
Of the CW Staff

Primarily a research tool, data banks containing the clinical histories of large numbers of patients with a common ailment can – and are – beginning to have a direct impact on actual patient care.

Designed to store and retrieve massive amounts of information on patients with chronic illnesses, such data banks can permit physicians to anticipate the effects of their interventions in diseases that can't be alleviated overnight, according to Dr. Frank Starmer, director of a cardiology data bank at Duke University in Durham, N.C.

Computers At Work In Medicine

"We're in the data banking business to try to fit patients with chronic illnesses into the context of past patients and past treatments," he said.

Unlike the acute setting, where reactions to treatment are relatively immediate, chronic illnesses require considerable time before patients' responses to specific treatments can be perceived and understood, Starmer explained.

A patient with pneumonia, for example, can be treated with penicillin and the effects of the drug will be known within hours. But treatment of a heart disease can span over a much greater time period and involve a more complex and varied range of treatments.

Patient Options

Like H.G. Wells' time machine, such data banks "give physicians the information they need to treat chronic diseases as though they were acute," Starmer said. In addition, these banks enable patients to anticipate the effects of various treatment options and see how people with similar problems fared depending on the treatment routes taken, he noted.

For example, a patient may opt for the less expensive form of two treatments if he knows the experience of other cases like his indicates only a 2% to 3% difference between the survival rates of these therapies.

The cardiology bank at Duke presently includes data on 4,000 to 4,500 patients who have been admitted to the coronary care unit at Duke Hospital or have come for an examination of chest pain, with followups on many patients for as many as six years, Starmer commented.

Run on a Xerox Sigma 5 and a Digital Equipment Corp. PDP-11/45, the data bank, according to Starmer, operates on very general problem-solving procedures: a physician takes a position on a medical problem, looks at the accumulated experience relating to the problem and modifies his position as a result of that experience.

Physicians at Duke Hospital have begun to feel that unless they know how cardiology patients react to certain therapies over the long haul, they can't really help them, Starmer said. As a result of the information gathered in the data base, he added, the hospital has been able to identify a group of "low-risk" patients who can be discharged from the hospital earlier than most heart attack patients.

"We discovered by observing our data that if a patient was uncomplicated by the third day of hospitalization, he would not die of heart failure for a minimum of six months," he said.

"The hospital now releases those who fall into this category at the end of seven rather than the usual 14 to 15 days, creating an average savings to the patient of $2,000."

But while data banks can have a positive effect on patient management and hospital utilization, Starmer said the mechanics of acquiring initial data and the difficulties of following up on this information make their establishment uncommon.

"Few large medical data banks exist because, without sufficient follow-up data, they are dead in the water. They must provide the physician with feedback on his diagnosis or treatment procedures in order to be any good at all," he said.

Assuming these problems of data acquisition are solved, Starmer anticipates a regional network of cardiology and other banks that will incorporate the regional characteristics of a given disease.

And, "if economically possible, these banks will become the logical adjunct to the medical library," he added. Consisting primarily of journal articles, the library can't afford the space to describe such large patient populations with great detail. Articles are restricted to defining the "average" patient by talking means and standard deviations, Starmer explained.

Architect of some 20 data banks using the same IBM 370/158-based system, Dr. James Fries at Stanford University in Palo Alto, Calif., also expects such data banks could be extended to include a national network. He envisions perhaps 20 centers located throughout the country, each dealing with a particular problem and contributing to its own patient files.

Designed "to assist physicians in making appropriate clinical decisions," the Stanford project began with a data bank on arthritis and has grown to include information on a number of chronic diseases. Each bank contains a detailed description of several different cases, relating cause and effect of treatment in each instance, he stated.

Like Starmer, Fries emphasized the importance of managing and retrieving files along a time dimension.

"In order to properly prescribe for a patient, physicians must know what happened to him in what sequence," he said.

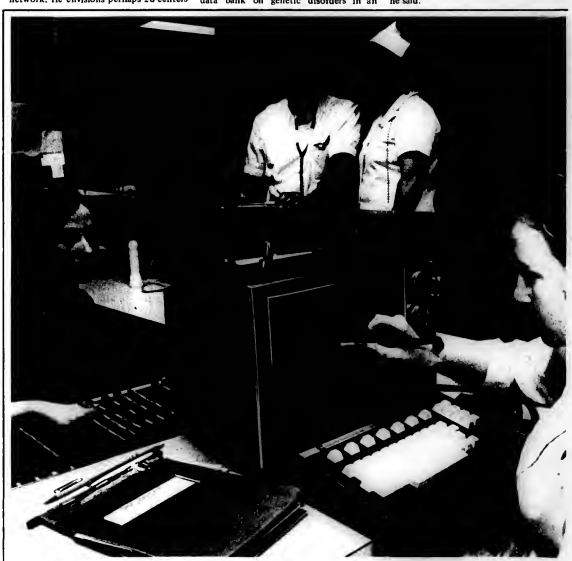
Satellite Clinics

Lacking the extensive federal, foundation and society funding available to Fries and Starmer, Dr. Theodore Kushnick at the New Jersey Medical School operates a data bank on genetic disorders in an effort to aid research should a breakthrough in the treatment or cures for any one of some 2,000 known disorders occur. The main purpose of the data bank, however, is to provide approximately 3,000 New Jersey families who have one or more disorders with appropriate genetic counseling, he said.

In 1973, the National Foundation March of Dimes did award the project a grant, enabling Kushnick to expand the medical school program to two satellite clinics in the state. Of the patients, 90% treated by the centers are referred by private physicians.

Kushnick hopes the center, in operation for two years now, will eventually resemble New York State's network for testing and counseling people with genetic disorders.

"Data banks linked to satellite clinics located throughout the state provide the only feasible means of keeping track of these so-called 'natural malformations,'" he said.



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Spectra Medical Systems Inc

Medicaid Systems Designers Find

Good 'Transferability' Dose Ensures Financial Health

By Edith Holmes
Of the CW Staff

Whether implemented at a county or state level, a system designed to monitor and control Medicaid payments must be "transferable" in order to receive government funding.

Experiences in Monroe County, N.Y. and Utah also indicate a system's chances of acceptance for a state or federal grant are further improved if its designers incorporate packages for the review of physician, hospital and drug utilization.

Computers At Work In Medicine

In order to receive financial and technical assistance from New York State, "we had to agree to develop and implement a system base that could be put into any county," according to Shirley Harvey, deputy director for Medicaid in Monroe County's Social Services Department.

"By persuading every county to accept a certain base for operations, New York can build a statewide system for control of Medicaid payments," she added. Suffolk County has already accepted the "Model Medicaid Program," Harvey noted, and Erie and Chautauqua Counties are considering its adoption.

Over the last three months, the Medicaid branch of the Social Services Department has succeeded in adding packages designed to point up possible overutilization of drugs and physician services. Emphasizing the system "can only demonstrate questionable usage," Harvey indicated the addition of these programs was a logical next step toward control of Medicaid payments.

Goals Accomplished

In operation for the last two years on an IBM 370/155 with 1M byte of core and processing some 4,000 claims a day, the Monroe system has helped the county accomplish what computerized Medicaid systems were originally intended to do, cut Medicaid costs and speed its payments.

In the system's first year of full operation, Harvey estimated $1.1 million had been whittled from the county's Medicaid bill through spotting of duplicate claims, errors in charges and eligibility and claims by persons who could use other medical insurance for their bills.

Describing Medicaid as "the payer of last resort," she stressed the program's need to be certain medical bills can't be handled by some other means.

Medicaid payments for health care for the county's poor totaled $47 million last year, up $5 million from 1973. The state reimburses the county for 75% of the payments, the Federal Government pays the state 50%.

Even with the savings from its computer operation, Harvey expects the county's Medicaid payments this year to reach about $58 million because of a rising welfare case load and the end of the price freeze on health care.

During the six months when the county was switching from manual to computer claims processing, 60,000 Medicaid bills totaling $1.5 million piled up, Harvey recalled. Some were seven months old.

This backlog was cleared up in the first three months of full computer operation. Payments are now made to health care vendors on a weekly basis, each provider receiving his payment within four weeks of billing, she said.

Utah MIS

On a state level, Utah's Information Processing Center has spent the last 20 months developing a medical management information system (MIS) that will start operation by July 1.

The state received funding from the Department of Health, Education and Welfare (HEW), but only because it met the guidelines and design specifications published by that agency, according to Pat Wilde, project director with responsibility for the system's development and implementation.

"In order to receive acceptance as a model Medicaid system, a design must include a maximum of transferability," he said. "If developed along HEW guidelines, the system will be 90% funded by the Federal Government. After implementation, a model system will get 75% of its operating funds as well."

Wilde has a legal as well as systems background, and he noted the federal regulations concerning Medicaid system funding and development made his knowledge of the law "most beneficial.

"Any slipups and we would have had to forfeit funding," he said, adding Utah "is the first state to be accepted as meeting HEW's requirements.

"In addition, we were among the first states to have a conditionally approved Physician Service Review Organization (PSRO). As a result, we began work early to develop an automated system for reviewing the ambulatory care provided by physicians," he said. He suggested this increased Utah's chances for a federally funded Medicaid MIS.

Will Start in Summer

The system will begin operation this summer on the state's IBM 370/158 with 2M bytes of memory. PSRO programs have been incorporated into the Medicaid MIS, Daniel Reilly, DP coordinator with Utah's Department of Social Services, noted.

The department received some design help on its Medicaid system from Consultec, an Atlanta consulting firm. Optimum Systems, Inc. in California advised the state in its efforts to develop the PSRO system, Wilde stated.

Cost $810,000/Segment

Otherwise, the bulk of the combined system's actual specifications and programs written in Cobol were the work of the Information Processing Center. The development of each portion of the system required expenditures on the order of $810,000 per segment, he said.

Despite its transferability, the system has been designed for use in Utah, Wilde emphasized, adding that any transfer of system information would require some modification.

"At this point, we have tailored for our use some of the concepts developed in other states and have transferred some of our developments as well," he stated.

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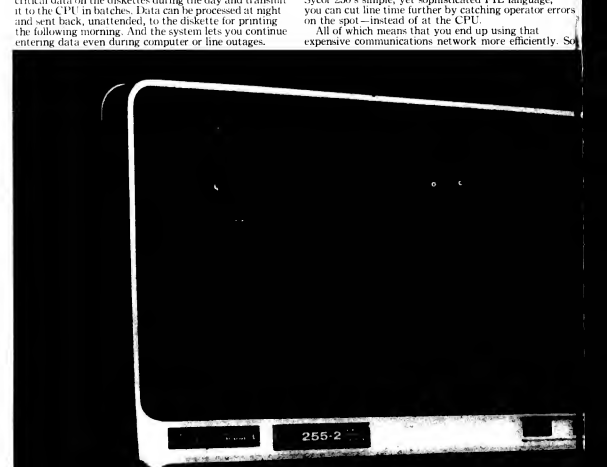

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Only Total Hospital System Results in Cost Benefits

By Edith Holmes
Of the CW Staff

MOUNTAIN VIEW, Calif. — The only systems in a hospital setting that eventually pay for themselves are total medical information systems (MIS), according to Charles Hornisher, manager of communications with Technicon Medical Information Systems Corp. (TMIS) here.

Computers At Work In Medicine

"A straightforward system linking a nursing station to a lab, a pharmacy and the billing department of a hospital may be cheaper to buy but will never pay for itself," he said.

In addition, Hornisher noted the clinical, financial and administrative requirements of a large health care institution require a large, general-purpose computer.

"These applications are just too sophisticated; their depth is too great to be handled by minicomputers," he stated. "They require a machine at least the size of an IBM 370/145."

Hornisher based his comments on his firm's experience implementng a real-time computer communications system at the 450-bed El Camino Hospital (ECH), also in Mountain View.

Implemented by TMIS on a service basis, the installation handles patient admissions, builds data bases, performs requisitions and scheduling and produces the billing when the patient is discharged.

Based on 57 Technicon T-201 video matrix terminals with light pens and 26 T-300 multiprinters scattered throughout the hospital, the system ties into an IBM 370/155 via 50 kbit/sec leased lines. Three mims located at the hospital are used for message switching and for interfacing laboratory equipment.

The cost benefits of the system at ECH have been studied by various individuals and Blue Cross, and the National Center for Health Services Research and Development of the Health Resources Administration of the Department of Health, Education and Welfare (HEW) will publish its evaluation of the impact of MIS on ECH this fall, Hornisher said.

The figures developed by Blue Cross are among the first "hard" data available since the system became operational three years ago, he commented.

They indicate El Camino patients had an average savings of $88 per hospital stay when compared with all other Northern California hospitals with Blue Cross subscribers during this three-year period. These patient savings resulted in $420,000 in savings to Blue Cross for the 4,800 annual Blue Cross admissions to ECH, he noted.

Blue Cross also found the average hospital stay at ECH was shortened one-fourth of a day in comparison with the other hospitals, Hornisher remarked.

A separate study comparing El Camino patient data to similar hospitals on the San Francisco penninsula provided corroborating evidence that the medical information system cuts hospital costs, Hornisher said. This study showed a reduction in nursing costs per patient stay of 8% at ECH, despite increased nursing services, while other hospitals had a 5% increase.

A nurse at El Camino Hospital uses a light pen on a Technicon T-201 video matrix terminal to access information concerning a patient.

While the study concluded "insufficient actual cost savings or cost-containment data are available to determine the true cost-effectiveness of MIS," it noted cost benefits like the decrease in nursing expenses coupled with the increase in nursing staff time spent in direct patient care "appear to justify continued support and expansion of the system."

Extent of Actual Use

But "the real trick to cost-justifying a total medical information system rest with the extent to which the system's benefits are actually used by a hospital's management and health care personnel," Hornisher said. "If the providers of health care don't use the system, its costs can hardly be justified."

He added that, while an informal vote of the nurses at El Camino indicated 94% would not want to do without the system, the doctors appear "highly noncommittal.

"We've done some studies to see how many doctors use the system directly for such functions as ordering medications and tests and have found that about 74% of the physicians use the terminal keyboard and light pen to input orders." These figures do represent an improvement, just under two years ago, only 46% of the doctors at ECH were in favor of the system and 42% wanted it removed [CW, June 6, 1973].

Dr. Ralph Watson, chairman of the El Camino Medical Staff MIS Committee, indicated more physicians are realizing the system "was designed to be used directly by the doctor, nurse and other medical personnel. This means the delays, misinterpretations and high paperwork costs involved in communications between physicians, nurses, laboratory and other hospital personnel is eliminated.

"In terms of patient care," he added, "the system has reduced charting errors by two-thirds and significantly reduced turnaround time in getting laboratory and X-ray work completed and the results available to the doctors and nurses."

Technicon originally acquired the medical information system from Lockheed Missiles and Space Division. Network installations at ECH from 1967 to 1971 were handled by Lockheed, but were taken over by Technicon in 1971.

From 1971 until August of last year, the hospital paid TMIS only the value of its savings from the use of the experimental system, he noted. ECH had the right to have the system removed.

In August, however, the health care institution signed a five-year, fixed-price contract with TMIS to cover continued operation of the system. The hospital now pays the firm $67,379/mo, which its administrators estimate is about $19,000/mo less than its savings from the use of the system.

Hornisher guessed the cost of the system per patient must be in the neighborhood of $7 to $9.

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Editorials

The Voice of the User

By an overwhelming majority, computer users have rejected the idea of licensing of DP personnel in the first *Computerworld* reader poll.

But while the users reject licensing, they realize DP practitioners have a responsibility to the public for systems that affect the general public and that some regulations need to be established to clarify that responsibility.

One of the best ways to ensure that proper measures are taken in the design of systems that affect the general public would be the development of a wide range of system review manuals that would outline the "proper" procedures to use in system design.

A project in this area has been under the sponsorship of the American Federation of Information Processing Societies (Afips) for many years and, to date, has produced one manual on the correct procedures for DP security.

Only through such an effort can the "proper" procedures be defined against which to judge the performance of system designers.

Unfortunately, such an effort requires a great deal of work by a dedicated professional body intent on defining its responsibilities and the procedures needed to live up to those responsibilities.

Apparently, the DP community is not yet a professional body, because this effort has received little support and little action over its six-year life. And, needless to say, it has achieved few results.

This type of work would be a much harder task than an "instant cure-all" such as licensing. It would call for hard work from people in DP as well as legislators and other public figures.

But it must be done – and quickly – before the false Messiahs loose in the land convince too many their message is the truth.

Remote Maintenance Appeals

The idea that computer systems can be maintained from remote distances with only incidental help from on-site users continues to appeal to IBM engineers.

The latest to explain the concept was IBM's chief scientist, Lewis Branscomb, at a computer/communications conference in Paris. And his remarks followed similar statements by an IBM engineer at the Ifips conference in Sweden last summer.

If IBM is to achieve this goal of remote maintenance through systems software, it will undoubtedly need the transmission capability to carry it out. And it may be significant that the remarks about this subject are being made overseas.

There are now a number of industry experts who see the IBM domestic satellite plan as only one point in a universal IBM communications system. At present, the plans for a U.S. satellite system seem curiously stalled, perhaps until IBM figures out how it can best proceed through the maze of regulatory roadblocks.

But on the international scene, the company has only to convince the appropriate postal telephone and telegraph agencies that it should become the keeper of the satellite communications – in the national interest, of course.

The first requirements in any IBM global satellite involvement are already surfacing as the company becomes a party to international data transmission standards efforts. It is obvious uniform transmission protocols will be required and IBM is working hard in that direction.

Unfortunately, the major decisions in these vital areas are being made almost totally in isolation from the needs and opinions of the average computer/communications user.

'Do I Get to Go In Now, Coach?'

Letters to the Editor

Dickinson College Satisfied, Plans to Expand With Interdata

I would like to clarify Dickinson College's experience with an Interdata Model 7/32 computer system ["College Converts to 7/32," CW, March 19]:

- The Interdata 7/32 system is now fully operational.
- As project manager, I am pleased with the system and definitely would buy a 7/32 again.

It is true that we experienced some delays during the installation, some of which were not the fault of Interdata at all.

However, what's also true is that Interdata made a very reasonable and honest effort to correct any and all problems.

In short, we at Dickinson College are very satisfied with Interdata and are looking forward to expanding the system in the near future.

Michael O'Heeron
Director of Academic Computing
Dickinson College
Carlisle, Pa.

Whining Terminals Health Hazard

It was with great interest that I read "Whining Terminals Case Mystifies Ohio University" in the March 12 issue.

As an employee of the Telephone Center mentioned, I felt the article was a misrepresentation.

The ITT Asciscopes were first installed at the main desk of the Ohio State University Library. At that point, it was determined by several of us that the "whine" would be overwhelming in the room presently in use at the Telephone Center. In November, six of the terminals were installed in the Telephone Center. Within the week, several employees, men and women, were complaining of headaches. The effects were additive, and new physical affects (migraine headaches, nausea, dizziness) occurred.

Within two weeks, grievance procedures were set in motion. There was no satisfactory action taken within the OSU Library system until the terminals appeared to start responding with erroneous information. The state of Ohio also was no help, as state safety regulations do not cover sound or frequency levels.

Late in January, J. Carroll Notestine, director of university systems, brought a representative from ITT to explain the situation. What was said at that meeting was that the "whine" was inherent to the terminals and that ITT would not look into a remedy to the problem. It was agreed at that time, two months – not two days – after installation, that six terminals in the Telephone Center, if necessary, would be removed.

Early in February, the Texas Instruments (TI) Silent 700 terminals were installed as a temporary measure.

The TI printers have slowed our operation 25% and are not a viable solution. But our health is much improved.

Carol Finley
Columbus, Ohio

Grosch's Law Remains

Don Berteau's letter [CW, March 26] talks about Grosch's Law being threatened by minicomputers.

The law, as I remember it, states: "Computer processing power increases as the square of the monthly rental charge."

My understanding of the origin and intent of Grosch's Law is very different from Berteau's. Grosch's Law is not a law of physics; it has nothing at all to do with the speed of electrons or Ohm's Law of Electricity.

Grosch's Law simply describes IBM's pricing policy for computers. Armonk invented the law. Grosch only claims to have discovered it.

This means, if my interpretation is correct, that as long as IBM follows the law and as long as the other mainframe vendors stay under the "umbrella," the law will remain. Minicomputers threaten the law only as they threatened IBM's pricing policy. The fact that they do not use the law in their pricing deliberations in no way affects its truth in the larger system market.

Stephen Auerbach
Englewood Cliffs, N.J.

Telex Decision Omen of 1984?

The court's reversal of the Telex decision in favor of IBM left me frustrated and speechless. I am glad to see Herb Grosch is finding words to state the long-range implications of this decision clearly and eloquently [CW, Feb. 26].

IBM's chairman, Frank T. Cary [CW, March 12], may complain that such characterization is somewhat overdrawn, but I think Grosch gets to the heart of the matter.

And Lynn Hopewell in the same issue and others who protest that IBM really markets good equipment and software miss the point. They may enjoy that IBM has to offer today, but will they enjoy it in 1984 when IBM has effectively eliminated all competition?

What reason will IBM have then to supply top-quality equipment and software or to offer it at a reasonable price when there are no competitors left?

Grosch is saying that 1984 may be closer than we think.

If antitrust regulation means anything at all, government should protect the free marketplace by limiting the size (percentage of sales) of the vendors in that marketplace.

A.C. Hendrickson
Silver Spring, Md.

(Other letters and commentaries on Pages 14 and 16.)

Letters to the Editor

Remedy Won't Work; Must Label Report

In reference to the March 19 article entitled "N.Y. Court Requiring Certified Printouts," the remedy chosen ("Printouts . . . stamped, dated and initialed by . . . operator") will not take care of the problem, which is simply that the computer report is not labeled with a title defining what it is. Apparently different kinds of reports have the same appearance.

The report causing the clamor will still look like a driving record even after someone dates and signs it as an owner inquiry.

Daniel Lance Herrick
Owosso, Mich.

New Category Needed In Accounting Firms

Over 25 years ago, when an independent accounting firm sent a man in to audit automated procedures, it was necessary to start by explaining the workings of the card sorter and to explain Hollerith codes punched into a card.

In 1975, after we have landed on the moon, we're still explaining the sorter and, if cards are 96 columns long, we've more explaining to do.

The fact that an accounting major takes a few DP courses on the way to his degree in no way makes him a match for the DP manager. How then, can he audit a system, procedure or department when he's low man on the knowledge pole?

The answer lies in creating a new job category in accounting firms, "data processing auditor." Recruiting must be done not from amongst college graduates but from amongst DP professionals. These people could be trained relatively easily in auditing and accounting procedures.

David Matlin
New York, N.Y.

OPD System Available

I have just finished reading the article in the March 12 issue describing the Mt. Sinai Hospital outpatient scheduling system ["Net Keeps Hospital's Waiting Rooms 28% Emptier"]. As a number of people have already inquired about the availability of the system to other hospitals and clinics, I would like to add some technical information to the report.

The outpatient department (OPD) system was developed by Listmark Computer Systems' Systems and Application Division. It was written using a completely modular technique with the average module being 3K bytes and the largest module being 6.5K bytes.

The primary language is IBM Assembler and there is both a DOS and OS version. In both instances, the system is designed to run under IBM CICS.

The original testing of the system was done on an IBM 360/40 at Listmark in an 84K foreground partition. The system was then installed at Mt. Sinai under OS/VS1 on its 370/145.

Howard J. Brock
President
Listmark Computer Systems
Norwood, N.J.

Although Directly Involved

Fever in the Veins

Mostly the patient just lies there, attached to all those grim life-support systems. Bottles of RJE and IMS and JCL drip into every major vessel. Frequent PL/1 doses are administered orally – cheaper than electroshock, and just as effective. Heavy OS and VS straps pin the poor devil down. The plan at the nurses' station is to strenghten him for the forthcoming major surgery: FS lobotomy.

His old friends fear that if he doesn't die, he will emerge from "treatment" a zombie, dehumanized, a walking corpse. But as the crisis nears, and fever rages in the veins, consciousness reappears. For perhaps only a few days, the patient revives, rebels.

This particular zombie candidate is, *mirabile dictu*, the IBM Computer Users Association of the United Kingdom. Not Guide, not Share, but CUA. So irate are the members at IBM cost increases that they have offered to testify over here we call it "squealing" – before the Common Market commission investigating whether IBM is a European monopoly, in the Treaty of Rome sense.

Turns out that IBM has jacked up maintenance charges 50% in the last year, as well as increasing prices for new equipment substantially. Of course there is fantastic inflation in Britain, but the game of socking it to 'em where price controls and competition don't apply – well, it's not unknown over here either! And not just in computer country.

The CUA plans to collect horror stories from its members and spoon-feed them to EEC (Common Market) investigators. Like the Justice Department here, the latter are spread pretty thin. I'm happily reminded of pre-Share and early Share days, when rambunctious 701 installation managers attacked Poughkeepsie, Endicott and Galactic Headquarters in platoon strength, armed to the teeth with nasty letters from Jack Northrop and telegrams drafted by Wild-Duck-in-Training Grosch.

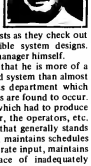
That is the proper relation between a user group and a supplier: suspicious antagonism. None of this namby-pamby mutual-admiration-society stuff. The DCA (Drunken Computer Association – erstwhile "Digital") will meet in Anaheim on May 23. The old Share founders will be there. We'll drink a toast – one of very, very many – to the CUA. May the patient prosper!

Herb Grosch

DP Manager Forgotten User in Systems Development

Last week our discussion was about users, as they are commonly thought about in DP circles. Users are those departments or individuals that want systems developed and operated for them and results delivered to them. They play a great part in the life of the DP operations and often lay down the rules with which the DP manager has to work.

The Taylor Report By Alan Taylor, CDP



But there is one user who is often forgotten when systems are being developed or being run, who gets few of the reports he needs, whose departmental operations are ignored and who is rarely interviewed by the systems analysts as they check out the impact of possible system designs. That user is the DP manager himself.

There is no doubt that he is more of a user of the developed system than almost anyone else. It is his department which will be blamed if bugs are found to occur. It is his department which had to produce the processing power, the operators, etc. It is his department that generally stands the racket of reruns, maintains schedules in the face of inaccurate input, maintains reliability in the face of inadequately protected files, etc.

The DP manager, moreover, is directly involved in the proper operations of systems as his main corporate function, unlike the sales manager, who gives a peripheral level of attention to the sales analysis, etc. The sales manager can do without DP, but the DP manager cannot.

Operational Ignorance

This lack of consideration of DP managers as users is brought to light when a system is on the air and is running. Running systems is considered to be rather a pedestrian operation by outsiders, and only when things are known to have gone wrong is more than routine attention paid to the activities of the DP department.

User managers don't tend to come in and ask for analysis of how their DP operations are working or how accurate the assumptions under which the system was built are turning out to be. Users, in the traditional sense, are simply not interested in these items.

But here is where the DP manager can head off later user problems. If he keeps himself informed about whether the basic assumptions of input quality, of file integrity, of usage characteristics and change over a period, as well as of processing costs, he can often find areas of potential problems before the using department has become aware of them.

Further, if he is then able to check them against the design specifications, he can locate – still ahead of time – whether the discrepancies are increasing or decreasing. He can see where solutions to problems which have not yet occurred are to be found. He can begin to understand the dynamics of work within his own department and the impact of omitting systems analysis functions from the development cycle just to make a delivery date: the changes (if any) that arise from better education of his staff, of the use of packaged programs, etc.

In fact, the DP manager can and should keep himself informed of all processing operations for present and future uses.

Computer Key

If he wants to keep himself informed about the way the various applications he is running are operating, he can, of course, try to do so with paper and pencil – waiting until errors and mistakes appear in the log book or in his in-basket. But the number of items involved can be too great to be handled in this manner effectively.

Moreover, checking whether the assumptions under which the system design was built are really valid requires maintaining ongoing records which are based upon input that has often passed into the archives and is simply not around. So, as well as being time-consuming, the task involves information storage, management by exception, development of trends, etc. It is, indeed, the very essence of a really worthwhile automation project.

The DP manager can greatly reduce his work and keep himself much more informed about the systems running in his department if the computer keeps these records for him. Not just usage records developed from the accounting data, but information like the following should be input:

- Frequency of adjusting entries in the input.
- Number of one-line-item hills and reports.
- Percentage analysis of input and output transactions.
- Frequency of references to particular types of tables.

In themselves, these items may not be interesting. Changes in them, however, can quickly tip off the DP manager to the fact that something is happening which either was not as expected or which shortly may be going out of bounds.

It is, of course, not to be expected that everything stays within given parameters or that the users' estimates are going to be correct. But if the problem is an unseen one – like the failure of a message system to maintain message files with the expected accuracy – it can be expected to be discovered in the adjusting entry analysis before very long and almost certainly before the user knows where problems are occurring.

So do yourself a favor. Start remembering that the DP department will also be a user of that system you are currently developing. Go out and corral the DP manager and the operations manager and the complaints supervisor, if you have one. See that their future requirements are incorporated into the design. There's no reason on earth why they should not be. Remember – the skin you save may be your own!

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DP Auditor Limited by Lack of Knowledge

By Gabriel G. Tashji
Special to Computerworld

Today, DP system audits are the greatest challenge to an auditor. The depth of the auditor's knowledge and involvement will shape the course of future DP audit responsibilities and effectiveness. The primary limitation on the DP auditor's effectiveness will be the auditor's lack of knowledge of the computer field.

In the beginning, auditing of the DP phase of first- and second-generation DP equipment was simple and slow. The audit technique did not offer any new changes from that used in manual operating systems. This audit technique was effective, because the first- and second-generation computer configuration and operation did provide a reasonable level of audit trails and controls.

With the advent of third-generation and higher level computer configurations, however, with high-speed multiprogramming, multiprocessing and large data storage capabilities, the nature of traditional audit trails has changed.

Unfortunately, the auditor has not been able to develop new techniques or approaches to cope with the new environment. The "auditing around the computer" approach, in many cases the prevailing practice among DP auditors, appears inadequate.

Audit Techniques

The DP auditor should understand the mechanics and capabilities of the hardware/software configuration and system control procedures before embarking on an audit and determine which applicable and appropriate audit technique is required.

The following are some of the known major audit techniques used by the DP auditors:

- Audit around the computer. This approach requires verification of input/output and balancing the controls.
- Test deck. The test deck approach involves the preparation of test data which is to be processed under audit control. The use of test data is generally analogous to the audit procedure of testing actual transactions.
- Generalized (software) audit packages. There are several generalized audit packages on the market. This approach provides the auditor with the use of the computer as a tool to manipulate and retrieve stored data (file) in the system.
- Minisystem. This approach requires design and development of a minicomputer system as an integral part of the applicable operating system.
- Display program core image. This approach provides a method, with the use of the computer as a tool, to compare individual application programs in the system in object module (load library) to the source program.
- Display program library director. This approach provides a method to validate that all programs in the system operation are authorized. A volume table of contents (VTOC) or "Liblist" procedure is available to provide a printout list of all programs and system submodules in the library.
- Programmed monitoring and file scanning. This approach is normally developed for use in a real-time computer environment. Programmed monitors are used to check, test and validate certain operations and detect any violation of security or operating procedures.

File scanning is used to check for security violations and for accuracy of balancing the files. File scanning technique could be obtained for statistical purposes on a particular file activity.

This approach is very effective for controlling inactive accounts in a bank or other financial institution, since major bank embezzlements occur in this area by bank employees.

The aforementioned audit tools and techniques, with the exception of the last three, do not require an in-depth knowledge of DP and could be performed by a less-DP-oriented auditor.

However, in my opinion, utilizing all or any of these audit tools and techniques still will not adequately cover the full audit responsibility of the DP auditor to corporate management.

Basic Objectives

Generally, a DP audit should include the following basic objectives:

- Review and determine the adequacy of established internal control and security features.
- Determine actual compliance with the established control procedures.
- Evaluate the characteristics of the system and its logic and ascertain the integrity (accuracy) of the data generated and processed.
- Define conditions and review the processing steps in relation to logical controls.
- Determine existing deficiencies and weaknesses.
- Establish steps to verify or supplement control and trail features.
- Provide a system approach to the audit.
- Develop comments and suggestions and report to management.

Traditionally, a regular (non-DP) auditor is educated and trained to conduct an audit of the financial and other records of the company. Audit activities are not restricted to any financial area of the operation, since the auditor is familiar with all related areas.

For example, a regular auditor is familiar with cost accounting, branch accounting, general ledger, consolidation, etc. As a result of this knowledge, the auditor is capable of conducting a thorough audit.

In the same manner, in my opinion, the DP auditor should have a working knowledge of computer programming, systems, teleprocessing, computer operation, job control languages, console messages, Customer Information Control Systems (CICS), etc.

As long as the DP auditor is deficient in technical skills in these areas, the DP audit effort will be compromised and generally inadequate. This deficiency is the real future challenge of the DP auditor.

Future DP auditors should know, understand and speak the language of computer people. They should be able to communicate effectively on a professional level, and they should get involved in DP and proceed as far as their experience, education, judgment, imagination and willingness to learn and work will take them. Otherwise, they will be the fellows with the green eyeshade of the profession.

Tashji is a DP management analyst with Continental Can Co., Inc., New York.

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Cincom announces "April Thinker's Day."

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Letters to the Editor

ANYWAY Could Be Simpler

Robert Higgins' proposed ANYWAY statement [CW, March 19] seems to me an unnecessary complication.

The same effect can be obtained more economically (and more intelligibly) by breaking his statement into two sentences:

```
IF condition statement-group-1
OTHERWISE statement-group-2.
Statement-group-3.
```

Pierre H. Berube
Keene, N.H.

How About IT Statement?

I agree with Robert A. Wonderly's call for an END statement in Cobol [CW, Feb. 26] and with Robert Higgins' call for an ANYWAY statement in Cobol [March 19].

How about an IT statement?

```
IF SP-TAX > .30 DIVIDE IT BY 2.
IF SALES PERCENT < 99.9 MOVE IT TO
   PRINT PERCENT.
IF PAY STATUS = SPACE MOVE "B" TO
   IT.
```

If Cobol is "English-like," why don't we make IT English-like?

Thomas Shafer
Columbus, Ohio

Cobol Still Good, Quick

I am tired of hearing how Cobol is bad, slow, inefficient, hand-cramping, how all nested IFs are easy to understand, how structured programming is going to save the DP world.

To this I say "Bull!" A lack of discipline, a lack of skill and an overabundance of laziness are the major causes of project failures.

Extensions to the current Cobol standards, statements to reduce programming coding and changes to adhere to logic design theory defeat its simplicity.

Cobol, if anything, has options included to pacify certain users, not to fulfill a genuine need.

An English-like, strictly structure program will not guarantee success. Only good planning, hard work and people can achieve success.

Chester C. Criswell
Cleveland, Ohio

Help on 1130 User

We have in our office an IBM 1130; recently we installed four magnetic tapes.

Since IBM doesn't furnish any software, we are interested in hearing from other firms and universities with an 1130 and magnetic tapes. We wish to contact them to learn where to buy software, especially Sort programs.

Jean-Jacques Reuter
Director
Engepel
Rua Rio Grande do Norte 1164
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'Customar' Aids Credit Checking

MIDDLEBURY, Conn. – Management of accounts receivables and credit systems is simpler and more timely in IBM 360/370 installations under a Customer Information Control System (CICS)-based on-line version of Customar now available from Computeristics, Inc.

The package was originally released and is still available as a batch-oriented application. The On-Line Customar has been designed to interface with the batch system if both operating modes are desired, a spokesman noted.

Developed for Computeristics' internal use, the batch system provided a lot of information but forced credit authorization personnel to rely on printed reports generated at the previous processing cycle for the status of accounts.

The on-line system, on the other hand, is an interactive application providing updating and retrieval of credit information on a real-time basis. This would allow the user to be aware of all credits or debits incurred up to the moment the current decision is being made.

On-Line Customar also permits direct entry of billing information through a CRT terminal. Data on payments can also be entered directly from a terminal or transferred from bank lock-box locations through National Check Transmission Service offered by First of Boston Computeristics, a subsidiary organization.

Although printed reports or customer statements can be requested at any terminal with hard-copy capability, the system includes security procedures to prevent access by unauthorized personnel, audit procedures are also part of the system, Computeristics added.

The firm refused to provide any information about the cost of the on-line version of Customer, noting that it would depend very heavily on the amount of tailoring required to fit it to a user's needs. The latest issue of the *ICP Software Directory*, on the other hand, shows the batch version costs $50,000.

Computeristics is at the Oxford Management and Research Center, 06749.

'Staple' Backs Structured Tests

By Don Leavitt
Of the CW Staff

GAITHERSBURG, Md. – Instead of just talking about structured programming, Dr. Selden Stewart of the National Bureau of Standards (NBS) has created a language, called Staple, that forces users to work in structured formats.

One of the complaints with conventional, unstructured programming is that it does not demand a rigorously defined flow of control. Staple is a block-structured language which allows entry to a block only at its beginning and departure only at its end.

The experimental language has gone through one version which was designed to a very narrow definition of structured programming. The current version, now in use on the NBS central computer facility, has been enriched somewhat, Stewart said, to see what practical problems might be encountered by being more flexible.

On the staff of the NBS Institute for Computer Sciences and Technology, Stewart developed Staple by utilizing conventional Fortran syntax and semantics for the noncontrol statements, but providing new control structures to replace the GO TO, IF and DO statements that normally control Fortran programs.

The primary design goal of Staple was to clearly demonstrate the principles of structured programming. Beyond that, Stewart thought, it should be easy to implement, be easily modified for further experimentation and capable of running on a wide variety of computer systems so others could perform experiments in different environments.

Stewart is presently working to upgrade Staple from a research tool to a "full" programming language with more practical applicability. He also plans some syntactic modifications to accommodate human factors that were not considered in earlier versions. A user guide will be developed "eventually," he said.

Staple is being used at two Naval laboratories as well as at the NBS site. Since it has met its design goal of portability, it can in fact be run on most computers, NBS said.

The language processor itself is small, Stewart said, amounting to the equivalent of "about 1,000 Fortran statements."

If enough users want to work with Staple, the source code will probably be turned over to the National Technical Information Services in Springfield, Va., for distribution, the developer added.

Meanwhile, narrative descriptions of the language have appeared in the January 1975 issue (Vol. 1 No. 1) of the *Journal of Computer Languages* (published by Pergamon Press in Oxford, England) and will probably be brought out in this country as an NBS Technical Note in the near future, Stewart said.

'Diskplay' Shows Data Set Locations

SUNNYVALE, Calif. – IBM DOS and DOS/VS users can see how well they are utilizing their disk space with the introduction of Diskplay from Boole & Babbage, Inc. (B&B).

The software maps the data sets stored on disk by analyzing the Volume table of Contents (VTOC). Listing some of its findings in columnar form, it also produces a graphic picture of each track and cylinder on a pack, showing which are being used and for what purpose.

Diskplay creates and prints a listing of all files on a pack by locating and internally sorting the VTOC. This output provides "all pertinent information that is available," including percentages of Isam file overflow areas already in use, B&B said.

The listing shows each file by user-chosen identification, then by a Diskplay-generated single-character identifier symbol.

It also shows creation and expiration dates for each data set, its type of organization and extents, including notation of both prime and overflow areas.

Aside from header information showing when the report was made and for what disk pack, the graphic portion of the output provides a single print position for each of 100 cylinders across the page. Individual recording surfaces are shown in rows down the page.

The system then identifies the placement of each data set by printing its unique single-character identifier in each track assigned to it. It also shows unused portions of these extents by overprinting a slash through each unused track.

Defective Areas Listed

Defective recording areas are listed individually by cylinder, track and file at the bottom of each display of 100 tracks. If there are no defective tracks, that is likewise noted, B&B added.

A display of the second 100 cylinders on the disk pack is printed below the first so the user has a "photograph" of a complete disk pack on a single sheet of normal-sized stock paper, the spokesman said.

The program can be used with DOS/360 Release 25 and above to analyze IBM 2311, 2314, 3330 or 3340 disk packs or compatible replacements from other manufacturers.

Diskplay takes less than 20K bytes, costs $495 and is available from B&B's Miniature Products Division, 850 Stewart Drive, 94086.

'DBDA' Handles Data Base Design Process

WHITE PLAINS, N.Y. – Users operating under IBM VS environments apparently will be able to produce a data base more rapidly and thoroughly than manual analysis methods permit when the Data Base Design Aid (DBDA) is released by IBM during the second quarter of this year.

The package is described as "implementation-independent" and useful in creating data base designs for any of the currently available data base management systems. Not surprisingly, the designs can be applied most directly to a hierarchically-oriented system such as IBM's own IMS, a spokesman admitted.

The user-designer starts by providing DBDA with descriptions of the input, processing and output requirements of applications that will use the data base.

DBDA analyzes the design criteria for structuring the data base attempting to identify omissions, inconsistencies and redundancies in the requirements.

Finally, the software produces reports to guide the designer in determining the physical data base design. The report shows the data elements and the relationships among those elements, as well as a grouping of the elements into suggested segments.

Since it allows the user to examine various data base designs without actually making changes in existing data structures, DBDA can help users design bases for new applications, redesign and integrate existing bases or add new applications, new elements or new relationships to existing bases, the vendor noted.

An IBM program product, DBDA can be used with 370 systems operating under DOS/VS, OS/VS1 or OS/VS2. Scheduled to be available within the next three months, it will carry a monthly license charge of $200.

UCS Project Planner Uses Critical Paths

KANSAS CITY, Mo. – United Computing Systems (UCS) has added to its software library a system of programs that calculates project schedules by the critical path method.

Designed for the project manager as a tool for project analysis scheduling and control, the Least-Effort Scheduling System (Less/Time) is available on the UCS V1 system from either remote batch processing or remote job entry sites, according to the firm.

Less/Time features include a coding facility to associate network activities with other project information, revision and maintenance capabilities, network editing, report formatting and logic flexibility. The program is user-oriented with minimal input requirements, UCS said.

For more information on the Less/Time capabilities, the company can be reached at 2525 Washington, 64108.

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Tools Exist; Good Measurement Needs Dedicated User

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK – All of the tools and techniques needed to measure the performance of computer systems are available today and being used successfully in some installations, Saul Stimler of Stimler Associates said here recently.

But the process is still one that takes hard work and a dedicated staff, he told attendees at a Computer Caravan session.

"There is no such thing as a free lunch," Stimler said, warning users they will have to dedicate some resources – both money and manpower – if they expect to monitor their DP operations successfully.

The first part of the job in monitoring is to define what each individual means by the term "performance," he said, adding that "performance can be anything you want it to be. There is no perfect performance."

The definition of performance should be in terms easily understood by anyone who will be discussing the concept, from the technical people in the DP shop to the top management of the company, he said.

The performance criteria, at the same time, should be quantifiable and provable, he said, and the criteria should prove their usefulness by answering such everyday questions as, "When are we going to run out of capacity?"

When setting the performance expected, people in DP should remember that, as part of a corporate production facility, they are required to complete each day's work within the allotted time and turnaround user jobs on schedule.

If those two criteria are met, then the DP operation is next required to prove it is doing its job in the most economical way possible, he said, adding that economic factors are third in the order of priorities.

"Performance is a measure of how well DP systems are serving users," whether they are using departments within a company or programmers developing new systems, he said.

One of the problems with performance measurement today, Stimler said, is that there is no standard, universal measure for computer performance, such as horsepower applies to automobiles.

When any shop is developing its own measure, however, it should consider timeliness, turnaround time and response time in developing the criteria against which to judge the system.

At the same time, users should not only measure the performance of hardware, he said, but also include measurements of the software – both systems and applications – and the manual subsystem that supports the computer.

Logging Important Aid

Job logging can be an important help in this area, he indicated, since the number of jobs run during a particular period can tell a lot about system performance.

The other two major tools in use today, Stimler said, are hardware and software monitors. Results from these monitors can be compared with the job log for the same period to help identify problems.

The biggest problem with hardware monitors today, he said, that it is getting more and more difficult to find the proper probe points on some of the newer systems. In addition, users have to be very careful to make sure the monitors are hooked up to the same probes when rerunning a measurement, he said.

But even with the advent of hardware and software monitors, Stimler cautioned users not to overlook such things as the use of stopwatches to measure response time.

"Eyeballing" an installation can also provide uses with a great deal of information on how the system is really working and where the bottlenecks occur, he added.

"You can do a tremendous amount just by watching what is going on," he concluded.

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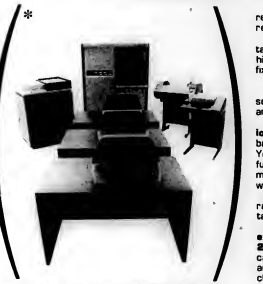

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These tables are not job assigned, so they can be used on several different jobs.

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The GCS 2100 also provides up to 99 format levels per job; up to 255 balance accumulators; variable length record and blocking factors; and up to 255 jobs stored in the system.

GCS 2100 Peripherals: GCS DataTone — data entry via Touch-Tone® telephones. GCS Data Tel — remote batch communications.

For more Great Computer Secrets, contact Agent 2100 at General Computer Systems, Inc., 16600 Dooley Road, Addison, Texas 75001. (800) 527-2568 toll free. In Texas (214) 233-5800.

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S/7 Data Entry Eased by 'SDCS'

ATLANTA – IBM's General Systems Division has introduced a data collection program for small businesses.

Designed for use with IBM's System/7, the Source Data Collection System (SDCS) was developed for first-time data collection users in manufacturing plants, hospitals, print shops, distributorships and processing plants with 50 to 500 employees.

IBM 2796 and 2797 Data Entry Units (DEU) relay the collected information directly to the System/7 by special hardware, eliminating the need for a separate controller.

As many as 31 DEUs can be attached to the system, each capable of performing as many as nine transactions, IBM said.

Data is entered through the DEUs with cards, badges or a keyboard. The System/7, in conjunction with SDCS, compiles and reports this information in either punched paper tape or punched card form for processing by a System/3 or other host computer.

As the job proceeds, employees record the information in the DEUs located near their workstations.

One of IBM's Field-Developed Programs (FDP), SDCS is available under license agreement for a monthly charge of $130 for six months, after which charges are waived.

Requirements for the controller-replacing hardware are determined by each user's application, and costs cannot be estimated without detailed analysis of the specific situation, IBM said. The hardware can be retrofitted to existing System/7 installations, a spokesman noted.

'Panvalet' Library Accessed By CICS With Interface

OAK BROOK, Ill. – Pansophic Systems has announced an interface to IBM's Customer Control Information System (CICS) for Panvalet, its program management and security system.

Called the Panvalet CICS Option, it is used by a CICS terminal user as a direct interface to an OS or DOS Panvalet library, the company said.

The option is said to act as an inquiry system for data sets and directory information and as a scheduling system for submitting batch updates to the operating system.

Priced at $1,800 on a perpetual license with maintenance after the first year at $360, the interface is available from the company at 1301 West 22nd St., 60521.

Contractor Gets Infonet Help

'Mister' Maximizes Monster Machine, Manpower Mix

BLADENSBURG, Md. – The 110 Mack trucks belonging to Excavation Construction, Inc. increasingly move under computer control because George Robinson, chief engineer, intends to waste none of the company's $80 million backlog of construction work during uncertain economic times.

"Ideally we want to be in a position where we have work for 105 of those trucks every day, because five will be down for maintenance or repairs," Robinson said.

Excavation Construction's managers looked first toward their own DP department for the extra support. They found processing time unavailable unless work was scheduled for a second shift on nights, Sundays and holidays.

The in-house programming and related software capabilities were inadequate for resource leveling and for managing critical path method (CPM) networks, according to James A. Dubsky, director of systems engineering. "We felt, after investigating costs, that it was unwarranted to upgrade our own NCR Century hardware for just this one application at this time," he said, "so we instituted a software and time-sharing search."

Made Combination Choice

Dubsky settled upon the combination of a program known as Management Information System for Time, Expenses and Resources (Mister) and a subscription to a time-sharing network. "Any good CPM will allow you to perform scheduling functions. What Mister does that no other CPM can do is utilize all your resources and level those resources across all your work so that you maximize the use of them," said Robinson.

The Mister program offered Excavation Construction several capabilities beyond regular CPM calculations, said Dubsky. These capabilities include:

- Capacity of up to 3,600 CPM network node/project, 4,000 CPM network activity/project and 300 network project/program.
- Resource leveling of all resources within projects, with calculations by time dependency or resource dependency.
- Time-dependent or resource-dependent leveling of all resources across all projects.
- Plotting of time-scaled arrow diagrams.
- Data sorting without the expense of rerunning CPM calculations.

The program also afforded debugging information before starting calculations, Dubsky said.

Robinson obtained the Mister program through a contract with the Washington regional Infonet offices of Computer Sciences Corp.

Planning to Experiment

The Excavation Construction computer will work as an I/O device for the Infonet system and perform data processing in-house until it needs to call on the Infonet system for special work the NCR cannot handle.

This will also give Excavation Construction economical experience with teleprocessing, allowing managers at construction sites access to both the in-house computer and the Infonet system through terminals at the construction sites.

With the Mister program, Excavation Construction receives charts and reports for all management levels. The program maintains a master schedule of all activities with monthly or weekly projections of average resource utilization.

The system's time analysis function draws CPM analyses and automatically generates time-scaled diagrams of the company's master schedule, individual project schedules and division schedules for each project. In addition, charts, tables and schedules can be updated automatically or manually.

Resource leveling is only one aspect of the firm's use of Mister as a management tool. "We need to know if we must bid work to maintain this level of use of our equipment or if we must buy or rent more equipment to complete the work we already have," Dubsky said.

"We will work also with 'gaming' our schedule for optimization of logic and minimizing the impact of delays caused by strikes, weather and the inevitable changes in scope of the projects," he added.

The master schedule contains a lot of "float" at any given time. This float is work that can be accomplished at the contractor's choice of time and pace; tracking this float and allowing Robinson's managers to work this off the entire building schedule during slack periods is one of Mister's critical resource utilization jobs.

To avoid disrupting his existing scheduling methods, Robinson is changing over gradually to the combined system.

Feed Formulation Put on Comshare Net

ANN ARBOR, Mich. – A system of nutrition analysis and feed formulation programs developed by Maddy Associates, a Comshare subsidiary, is now available on the Comshare Commander II system.

The Maddy system is designed to enable animal and feedstuff producers to formulate least-cost feeds, optimize animal production, control feed inventories and project company profits.

Originally developed at Monsanto by Dr. Kenneth H. Maddy, the feed formulation programs consider such variables as nutrient values, current market costs and inventory status to generate formulas which meet predefined nutritional standards and satisfy user profit goals.

Two categories of animal production programs are contained in the system. The first analyzes the best feeding plan for beef, swine and poultry and supplies an optimum date for slaughter. The second deals with egg production forecasting based on historical data stored on flocks of layers.

Economic projections can be performed for most animal production operations using standard production curve subroutines, Comshare noted.

Comshare is at 3001 South State, 48104.

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☐ UCC FIFTEEN (Restart Management System). Saves hours on restarting OS jobs. Simple, sophisticated software automatically corrects OS catalog, GDG biases before you rerun or restart.

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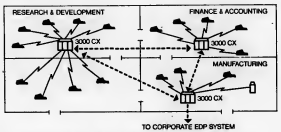

So, while the folks in R&D are using a Mini DataCenter for real-time data acquisition, shipping is using it to call up orders, and marketing is generating a quarterly sales report. As the volume increases, add another 3000CX (or two).

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Evaluate Characteristics

By Bob Brown
Special to Computerworld

CRT displays, keyboards and printers all have characteristics the user should evaluate in relation to the application he wants to perform.

When considering a CRT, the user should consider:

- Screen size and format. How large is the screen? How many characters per line? How many lines per screen?
- Character generation. How are characters generated – matrix, stroke, mask or some other method? If a matrix is used, what size is it? Are special characters (e.g., forms-ruling characters) provided? What type of phosphors is used? What is the refresh rate? Is the display pleasant and easy to look at for long periods?
- Character set. What standard characters are displayed? Can the character set be changed? How?
- Cursor. Are cursor controls provided from the keyboard? Under program control? Is the cursor addressable under program control? Can the program read the position of the cursor? Can the cursor be turned off?
- Editing features. What editing features (character insert/delete, line insert/delete) are available? What are these good for in relation to your application?
- Roll-up. Can the screen be made to roll up a line at a time from the bottom? Can it be made to roll down from the top? Do you need that?
- Scrolling. Does the terminal contain scrolling (paging) memory? How much? Is it accessible under program control?
- Video features. Can special video effects (blinking, bright or dim fields) be had? From the keyboard? Under program control?
- Field protection. Can certain fields be protected? Can unprotected fields be erased under program control? From the keyboard? Can only unprotected fields be transmitted? Can protected fields be erased under program control? From the keyboard?
- Split screen. Is screen splitting or partial-screen transmission available? Do you need it?.
- Arrangement. What is the arrangement of the keyboard? Teletype, typewriter, data entry (keypunch) or some other?
- Numeric pad. Is a numeric pad available?
- Function keys. Are special function keys available? How do they work?
- Touch. Is the touch of the keyboard positive and not unduly stiff?
- Repeating keys. Do any of the keys repeat if held down? Which ones?
- Special keytops. Are special keytops available for user-defined special functions?

And when looking at printers, consider:

- Method of printing. Is the printer an impact printer or some other type? If some other, what type – thermal, electrothermal, xerographic, ink jet, etc.? Is special paper required?
- Character formation. Are full characters used or is a matrix? What is the size of the matrix? Does it provide the needed print quality?
- Character set. What are the printable characters? Can the character set be changed? How?
- Print size. What is the pitch (horizontal spacing)? How many print positions are available? On what width form? What is the vertical spacing?

Terminal Selection — Part 2

Determine Gear Specs First

By Bob Brown
Special to Computerworld

When a user is shopping for a general-purpose terminal, the first thing to do is clearly define what kind of equipment specifications the application will require.

Financial considerations, hardware constraints at the central site and the reputation of the vendor also deserve consideration.

But the basic questions are: Do I need a CRT or a hardcopy terminal – or perhaps a hybrid? At what speed does the system have to operate? What are the line requirements, the interface requirements?

Some of the terminal specifications that the user should compare with application requirements are:

- Character set. How many different characters will a terminal generate? How many will it receive? What are they? Do certain characters initiate control functions?
- Character code. What code is used – Ascii, Ebcdic, Selectric, a paper tape code or some other?
- Speed. What speed or speeds are available? How are they selected?
- Configuration. Does the terminal operate in clustered mode or as a stand-alone device? What other hardware, if any, is necessary?
- Polling/Addressing. Can the terminal be multidropped? If so, is it pollable or must it "contend" for the line? Is the terminal addressable?
- Communications discipline. Is the terminal synchronous or asynchronous? What communications protocol does it support – teletypewriter, bisync, SDLC, DDCMP or some other?
- Interface requirements. Does the terminal have an RS-232B/C interface, a TTL interface, a current loop interface or some other?
- Modem or data set. Is a modem or data set required? Is one built in to the terminal? If not, what are the requirements for a user-provided data set?
- Parity generation/checking. Is parity generated by the terminal? Is parity checked on received data? Are any other error-checking features provided to assure data integrity?
- Internal Buffering. Is the terminal buffered? How big is the buffer?
- Compatibility. Is the terminal compatible with some other type of terminal? Which one – Teletype, IBM 2740, 2741, 2260 and 3270 or some other?
- Programmability. Is the terminal programmable? Is it parameter-driven or fully programmable? What is the instruction set?
- Auxiliary devices. What, if any, auxiliary devices are available?

The systems designer who can answer these questions will have narrowed his field of selection from literally hundreds of different terminals to a manageable lot. The unfortunate person who fails to do a little field narrowing will find himself bewildered by the vast number of choices available to him.

The lists of terminals published from time to time in the trade press are of great help in deciding which manufacturers' representatives to talk to for further information.

But even the best-selected terminal is of no use if the hardware doesn't work. The availability of a system is the portion of a given time interval that a system will operate. The keys to maintaining system availability are found in designing for reliability and in proper handling of failures.

One of the best ways to discover the reliability of any particular component in a proposed system is by talking to other users of the same type of equipment. Try to find out not only the mean time between failures but also the mean time to repair; it is of little use to have very reliable equipment if the user can't get it repaired when eventually it *does* fail.

Brown is chief of information systems research and development at the Medical Association of Georgia.

'Tone' Supports TSO Functions Under Both OS/VS1 and VS2

GARDEN GROVE, Calif. – Users who want to run IBM's Time-Sharing Option (TSO) with OS/VS1 or VS2 can install the Tone package from Tone Software Corp.

Tone currently supports TSO under VS2 and has now been expanded to include VS1 operation under Releases 3.0 and 3.1. The package does not require a Team implementation or the swap-region controller and is said by the developer to provide significant performance enhancements for the user.

To run between eight and 10 terminals, a 1M-byte partition is required. The system has thus far been implemented on a system with 15 terminals, but the exact level of terminal support will depend on IBM system configuration.

In order to develop the VS1 capability, the company used Release 1.7 modules of VS2 and further support for VS1 is planned unless IBM makes major operating changes.

IBM has thus far refused to allow TSO to run under VS1 because users are being urged into multitasking with a Virtual Number of Systems (MVS), a Tone spokesman said.

Tone supports the IBM 3270 (remote and local modes), 2740 (Models 1 and 2; 2741; and teletypewriters under Bram. The 2260 CRT is supported with GAM and the 1052, 3210 and 3215 are supported with EXCP.

The package leases for $200/mo and full 24-hour support is provided. Installation by the vendor is available on a negotiable basis. Tone is at 12341 Bluebell, 92640.

Lenkurt Adds 4,800 Bit/Sec Set

SAN CARLOS, Calif. – GTE Lenkurt, Inc. has a 4,800 bit/sec data set designated the 262A.

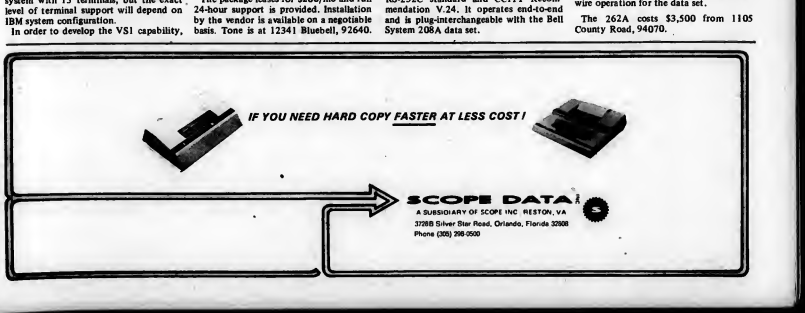
Transmitting and receiving synchronous serial binary data, the 262A data set operates over unconditioned Bell 3002-type private lines. Capable of half-duplex or full-duplex operation over privately owned or leased transmission facilities, the 262A is designed for point-to-point and multipoint polling applications.

The 262A complies with the EIA RS-232C standard and CCITT Recommendation V.24. It operates end-to-end and is plug-interchangeable with the Bell System 208A data set.

The 262A includes automatic adaptive equalization with an initial receiver training time of less than 50 msec, status indicator lights, switchable built-in loop test facilities and diagnostic test circuits.

Secondary data channels may be provided using the GTE Lenkurt Type 25C data transmission system and an auxiliary data-combining panel. Options are two channels at 75 bit/sec or one channel at 110- or 150 bit/sec. Additionally, the data-combining panel may provide two-wire operation for the data set.

The 262A costs $3,500 from 1105 County Road, 94070.



Former FCC Chief Says

Next Five Years Will Set Tone for 2000

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – What happens in the field of telecommunications in the next five years will pretty much determine how things will look in the year 2000, according to Bernard Strassburg, former chief of the Federal Communications Commission's (FCC) common carrier bureau and now a consultant.

Speaking at the annual meeting of the Computer Law Association, Strassburg said the crucial issues in telecommunications are based on "a body of new policies" which have emanated from the FCC over the last decade. The new policies include encouragement of new carriers and a lessening of control on the part of established suppliers of communications services and equipment.

Describing himself as a "participating architect" of this policy, Strassburg said it will ultimately lead to a "more enriched source of supply of communications" for all types of users.

But implementation of much of the policy is still "somewhat in doubt in many respects" and there are many issues pending on the federal and state level and in the courts that will have to be resolved in the next five years.

Among these issues are AT&T's Dataphone Digital Service, IBM's entry into the satellite field, proper pricing structures for carriers that operate in both competitive and monopoly modes to avoid predatory behavior and the FCC's proceeding on the resale or brokerage of carrier facilities.

On the state level, Strassburg cited the question of whether the specialized carriers will be certified to provide intrastate service, at what rates compared with the established carriers and whether the suppliers of independent equipment will be able to survive within the constraints being sanctioned by the state regulatory agencies.

"With certain exceptions, the state commissions are generally unrelenting in their opposition to the FCC's policies with respect to competition," Strassburg said. "Bell still has the upper hand in most of the states, writing its own ticket in shaping the extent to which we will have competition."

As an example, he noted the California regulatory commission has set a limit on the rates that can be charged by Southern Pacific Communications Co. (SPCC). The commission said SPCC rates could be no lower than present Bell rates and, even though the decision is an interim one pending further study, he called it discouraging.

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Terminal Tidbits

Livermore ADS 448/II Cost Cut 75% for Limited Time

LIVERMORE, Calif. – Livermore Data Systems is offering for a limited time a cash-only price reduction on its 4,800 bit/sec modem.

The ADS 448/II features quadrature amplitude modulation and adaptive equalization techniques. Said to be insensitive to phase jitters and line-level fluctuation, the unit includes a self-checking loopback capability for local data ports and line operations.

The modem uses nine basic card modules and data is delivered serially using one to four subchannels. Diagnostics are provided on the front panel.

The ADS 448/II is priced at $1,495 under the special offer; the unit originally cost four times that price, the company said from 2050 Research Drive, 94550.

Control/Log II Converts Data

ROCKVILLE, Md. – The Control/Log II instrument coupler from Computmetrics, Inc. automatically converts output data from conventional voltmeters, counters, waveform analyzers, digital oscilloscopes or transient recorders into Ascii code for entry into teleprinters, calculators or CPUs.

The unit transfers up to 10 digits of data from the instrument to serial Ascii devices and outputs one four-line character for control of the instrument.

The bench-mounting coupler for operation with Model 33 ASR TTY Teletypes using separate 5 VDC power sells for $595. Options include rack mounting, RS-232C interface and 115 VAC power input.

Compumetrics is at 12220 Wilkins Ave., 20852.

Ann Arbor CRTs Get Option

ANN ARBOR, Mich. – Ann Arbor Terminals, Inc. Model 2480 read-only and keyboard send/receive terminals are now available with a character accent option allowing users to select blink, reverse video or dual intensity accents under command control.

The Model 2480 display terminal is available in both design III desktop and series 200 modular configurations.

The character accent option on the 2480 is intended for applications requiring portions of data on the screen to be visually isolated from other portions. Switch-selectable page and roll modes are standard for displaying either tabular or textual data, the vendor said.

All standard interfaces, as well as all standard single or switch-selectable data rates from 110 to 9,600 bit/sec are available. Other options include auxiliary video output for daisy-chaining up to 10 external TV monitors to each unit, a 96-character set for displaying upper- and lower case or special character sets and export power.

Single quantity prices for the Model 2480 including the character accent option range from $1,090 to $2,010 and OEM discounts are available. Ann Arbor Terminals is at 6107 Jackson Road, 48103.

Comsat Filing to Extend Digist

WASHINGTON, D.C. – Communications Satellite Corp. (Comsat) plans to file with the Federal Communications Commission for permission to provide Digisat service in the Atlantic Ocean area.

The Digisat service would provide data communications service between the U.S. and Europe and South America.

Under the proposed service offering, Comsat would lease digital circuits designed for data users. The Digisat circuits would transmit data at speeds of 2,400-, 4,800- and 9,600 bit/sec. The advanced digital service would interface with existing terrestrial analog voice channels.

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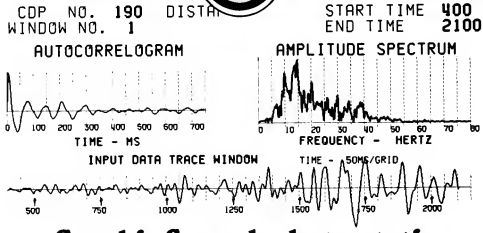

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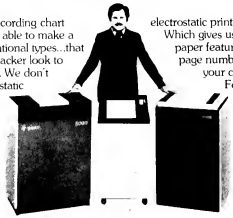

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Terminal Tidbits

Informer Mini Terminal Has Dual Polling Capability

LOS ANGELES – Informer, Inc. has introduced an addition to its line of miniature CRT terminals, the Model D-302, which has dual addressing capability augmenting the original ability to be polled after the operator has depressed a SEND key.

A CPU may address a terminal and accept its data, update data, set-up forms, etc., even if the operator has not pushed the SEND button to indicate completion of the task. This bypassing of the operator under program control permits individual terminal addressing to place high-priority messages on the screen of one or any combination of terminals (up to 64 terminals on a single port or modem), the company said.

The D-302 has the same desk-top unit design as the earlier Model D-301, with a full keyboard, including number pad and function keys. The monitor display consists of 16 lines with 32 char./line.

Optional features include key-controlled tab, automatic tab, choice of parity and choice of transmission speed (standard units go up to 9,600 bit/sec).

Price of the terminal is $1,990 with delivery in two weeks from 2218 Cotner Ave., 90064.

Modem Includes Diagnostic Lights

FORT WASHINGTON, Pa. – A medium-speed modem which includes status-indicating lamps to aid in problem diagnosis has been introduced by Tele-Dynamics, a division of Ambac.

The Model 7201 modem is a 2,000/2,400 bit/sec, strap adjustable automatic or manual answer data set for half-duplex operation on two-wire dial-up or private lines. It also operates in full-duplex mode on four-wire private lines, the vendor said.

The modem includes ten LED indicators forming a status reporting system for handshake operations.

By watching the pattern of lit lamps, an operator can identify system problems, according to Tele-Dynamics. For example, if the modem has received a request-to-send signal from the terminal and the clear-to-send lamp does not light, the operator immediately knows a problem exists.

The 7201 modem is Bell-compatible and can be used as a replacement for the 201A and 201B data set on dial-up or private lines. The modem provides local and remote loopbacks to aid in problem diagnosis.

Fully automatic answering is available when used with a Bell CBS or CBT Data Access Arrangement (DAA). Manual mode operation is possible with CBS or CBT DAA.

The modem costs $895 from 525 Virginia Drive, 19034.

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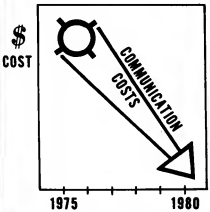

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Added Transmission Capacity Can Be Found in Voice Facilities

By Patrick Ward
Of the CW Staff

NEW YORK — When a DP group plans a data transmission application, it ought to look around for extra capacity in the corporation's voice facilities, according to Tim McDonough, manager of teleprocessing (TP) for GAF Corp.

McDonough told recent Computer Caravan attendees GAF once had two dedicated multipoint lines serving 13 terminals used for order entry. Communications alone cost $6,300/mo, he said.

One line went due west of McDonough's Wayne, N.J., office and handled three terminals that received relatively heavy use. The second line went west along the southern third of the country, serving 10 terminals that received lighter use.

GAF found that by switching the 10 less-used terminals onto an in-Wats line during night and nonpeak hours, it could shave monthly communications costs to $3,300.

The company currently has a voice project that will require another in-Wats line to Wayne "and we'll piggyback the other three terminals on that," McDonough said.

The Bell system's Telpak bulk rate circuit package can also be a money saver for users who have already cost-justified it but find they have extra capacity for data applications, he said. The TP user may only have to pay termination charges, he noted.

DDS Advantages

Such new transmissions options as Bell's Dataphone Digital Service (DDS) and satellite transmission may also save money, provided they match a user's application needs, he said.

While GAF is not yet a DDS user, McDonough said the all-digital service appears to have several advantages. Analog transmission brings attenuation delays that become magnified when the signal is amplified; under DDS, Bell has said signals will be regenerated or re-created, leading to an error rate that could be one magnitude better, he noted.

Bell has also stated DDS lines will have a centralized repair bureau with control of the complete circuit point-to-point, plus automatic switching from bad circuits, McDonough observed.

Since DDS transmission does not require modems but uses less-expensive timing devices from the phone company, McDonough said GAF might have to pay only $423 for a DDS link from Wayne to Philadelphia, compared with $765 for a point-to-point link.

GAF is already doing satellite transmission of both voice and data from Portland, Ore., to Wayne, he noted. Propagation delay has not been a problem and costs are lower, he reported.

Whenever GAF plans a new TP of any sort, it outlines the maximum expected volume and not an average level, McDonough said. The TP group "talks to the people who actually generate the orders" to find out how many characters there will be per order.

When evaluating the cost of a new application "it's very important to take a cash flow accounting look to find the real corporate price of the system," McDonough advised, because it might be less expensive than it looks at first glance.

Tycom 4210 Terminal Runs at Remote Sites

FAIRFIELD, N.J. — A system designed for remote site data and information collection and dissemination is available from Tycom Systems Corp.

The Tycom buffer communications system Model 4210 consists of an IBM Selectric typewriter, a 4K-character buffer expandable to 16K characters and a 1,200 bit/sec automatic answer modem.

In operation, data, messages or information can be typed on standard forms, using the Selectric typewriter. The buffer system with its microprocessor is capable of editing, correcting and searching for specific characters in the text to change or update the information, the vendor said.

Once the data is verified, it is entered into the protected area of the buffer for automatic, unattended transmission to a central site at 1,200 bit/sec. At the same time, messages can be received and stored in another protected area of the buffer.

The Selectric typewriter provides a direct source data capture of orders, invoices and purchase orders as well as routing information. Off-line, the typewriter can be used for regular typing.

The Model 4210 is priced at $6,500 with delivery in four weeks from 26 Just Road, 07006.

Bell 30-Day Lease Advantageous

By a CW Staff Writer

NEW YORK — With today's quick changes in data transmission options, the 30-day lease available on Bell System modems is a nice thing to have, Tim McDonough, manager of teleprocessing (TP) at GAF Corp., told Computer Caravan attendees here recently.

In the early 1970s, GAF went to independent modems because Bell's higher-speed units did not offer automatic equalization and dial backup, he explained. Current Bell products offer these capabilities plus the advantageous 30-day lease.

McDonough said GAF has minimized multivendor finger pointing by pinpointing problem areas itself. Part of this effort centers around the modems at the TP center here.

"We gave the phone company a schematic of how we wanted things racked and labeled," McDonough said. Patch panels now allow the staff "to jack any modem to any IBM 3705 port and any line to any modem," he said.

The communications center can test any modem locally and run a loop-around test to any remote location, he said. The dial backup can also test the line.

If the problem is the phone company's, the GAF TP staff can "give it the circuit number and describe the problem," he said.

GAF's patch panel is kept under lock and key during off hours and under the eyes of a guard during daytime so nontechnical types won't upset anything, McDonough added.

'75 NCC PREVIEW

A PROGRAM OF HIGH RELEVANCE

As preparations for the 1975 National Computer Conference, May 19-22, reach the final stage, one thing is clear: this will be the most comprehensive and relevant data processing conference and exposition ever held on the West Coast. More than 400 industry leaders and experts will probe a wide range of topics with special emphasis on problems and solutions as they impact current technical, economic, and social issues.

As detailed in the '75 NCC Program Booklet, some 90 sessions will cover critical topics in three major areas . . . Data Processing Management and Applications, Science and Technology, and Interaction with Society. In the Anaheim Convention Center's 230,000 square feet of exhibit space, thousands of products and services will be displayed by more than 250 organizations, permitting on-the-spot "hands-on" evaluation and comparison.

The conference opens May 19 with the NCC Keynoter, Prof. Jay Forrester of MIT, discussing computer modeling of social systems with special reference to forces underlying current inflationary trends. The program and exhibits, featured speakers, special events, and social activities will make this year's NCC an imperative for data processing specialists, computer scientists, users, administrators, and educators.

A SPECTRUM OF PRODUCTS AND SERVICES

Virtually every type of data processing technology, product, and service will be represented in displays and demonstrations at Anaheim. More than a thousand technical, marketing, and management representatives will be on hand to answer questions and supply technical and commercial data. NCC will be a showcase of mainframes, minicomputers, data communications systems, displays, terminals, memory systems, software systems, test equipment, time-sharing services, and much more . . . many shown for the first time.

NCC PROGRAM: CHALLENGES AND SOLUTIONS

Rapid advances in computer technology and interaction of these developments with users and society will be analyzed during the '75 NCC program. The program will cover such relevant areas as the interaction of computer hardware and software, storage technology, microprocessors, development of user requirements, data base management, computers and management, health care, banking, and computer-communications networks.

Detailed information on these program areas and others, plus additional aspects of the conference, are covered in the '75 NCC Program Booklet, available in advance to all full-conference preregistrants. Included are abstracts of each session, lists of chairmen and participants, a pullout schedule of sessions and events, a rundown on special activities, and general NCC information.

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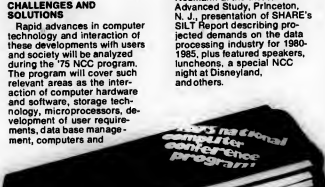
Mail this coupon prior to May 1, 1975 to preregister for the full '75 NCC and to obtain advance information on the NCC program. Full-conference advance registration entitles you to your gold Everything Card, representing a $15 saving over full-conference registration at Anaheim, plus advance information on a special NCC travel package providing savings of up to 30 percent, conference luncheon discounts, advance housing arrangements, and the '75 NCC Proceedings.

ROUNDING OUT THE PROGRAM

A variety of high-interest special sessions and activities will round out the NCC program. These will include a special Pioneer Day program on Wednesday, May 21, to honor the team that was associated with Dr. John von Neumann at the Institute for Advanced Study, Princeton, N. J., presentation of SHARE's SILT Report describing projected demands on the data processing industry for 1980-1985, plus featured speakers, luncheons, a special NCC night at Disneyland, and others.



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3M COMPANY

Wise Use of Resources Eases Small Shop Operation

By E. Drake Lundell Jr.
Of the CW staff

NEW YORK – "In a small center, you get less service, have fewer resources and a smaller margin of error than in a large center, but you have just as much responsibility and just as much to do."

That's how Janis Miller, a veteran of several years in a small shop with Standard Security Life, views the difference in operation between large and small DP centers.

In the small shop, people can't specialize as much as they do in larger operations, which sometimes means the small center will lack needed resources, she told Computer Caravan attendees here last week.

But, at the same time, the small operation makes for people who are better informed about the entire operation and not just caught up in a specialty. In addition, people tend to become more integrated into the company than they may be in large installations. They have a better view of the company's operations and objectives, she said.

Personnel Backup

Because of the smaller staff, the people in a small center have to be able and willing to learn to back each other up, she said, noting that the absence of a keypunch operator for just one day could seriously impact the entire operation if there were no backup.

People in the small center have to be cross-trained in order to provide such backup, she said. As an example, she noted that keypunch personnel could make good control people because they know card layout and output formats.

Similarly, programmers must double as analysts and have to learn quite a bit about the company's business to be successful in the small center.

In addition, operators need to be given a chance to extend their horizons and learn as much about the operation as possible, she said. They can be key in the smaller center and can get more mileage out of the system than almost anyone else if allowed to learn about it in depth, she added.

But the most important single member of the team in a small center is the DP manager, she said, because he sets the tone for the rest of the DP staff and has to communicate with the top management of the company.

Because of this, the DP manager has to be corporate-minded and know the overall corporate operation and goals to facilitate communication with the management of the company.

Planning Important

Planning is also important in the smaller center, Miller said. A plan provides a structure to make sure the center's resources are being used efficiently – particularly since those resources will necessarily be limited.

Documentation is also extremely important in the smaller center, because the time is not available to track down problem areas for maintenance and correction.

At the same time, Miller said the documentation need not be complex and should be easy to use. It should explain as simply as possible the nature and purpose of the system, she indicated.

Education is important in the smaller center, because people have to be able to do many different jobs and because the personnel in the smaller center is its most important resource.

Operations research sounds like a term that would only be applicable to the larger center, but is also important in the smaller operation because it can be used to graphically represent where the operation is headed and what projects are in existence to prevent any duplications or unnecessary work.

Consultants Lend Expertise

Consultants can also be used by the smaller center to get access to expertise not available on the staff. And often the consultants can be used to help train staff people in new areas instead of doing a whole project on their own, she said.

Miller said people in small centers should keep in touch with other users for advice on new projects. At the same time, the user has to be willing to reciprocate, she added.

Small centers are in the majority, Miller indicated, and they often can be more productive than larger ones because they are not bogged down with as much red tape or bureaucracy.

NBS Develops Two Standards for Codes, Controls

WASHINGTON, D.C. – Two computer standards directed toward improving the use of automated systems by federal departments and agencies have been approved by the Secretary of Commerce.

The standards were developed by the Institute for Computer Sciences and Technology of the National Bureau of Standards (NBS) in cooperation with the American National Standards Institute (Ansi). The standards will be used in the acquisition of all new federal computer systems beginning on June 1, 1976.

The first standard, "Code Extension Techniques in 7 or 8 Bits," provides uniform methods for extending the 7-bit coded character set of Ascii. This extension allows additional characters and control codes to be added to the existing alphabet used in computer and telecommunications equipment and applications.

The standard, which will be published by NBS as Federal Information Processing Standard (Fips) 35, has been adopted as a voluntary national standard by Ansi and the International Organization for Standardization.

This standard allows the extension of computer alphabets so other language symbols can be processed and interchanged. It is expected that it will provide for the first time a technical capability for the worldwide interchange of data. Associated standards are now under development for the Greek, Cyrillic and African alphabets. Also, additional Roman and mathematical symbols are to be provided.

Fips 36

The second standard, "Graphic Representations of the Control Characters of Ascii," provides standard symbols (both pictorial and alphanumeric) for the control codes used in computer and communications operations. In the past, no common method for displaying or writing these codes existed.

This standard, to be published by NBS as Fips 36, has been adopted by industry as American National Standard X3.32 and as International Standard 2047.2.

In '974, an NBS assessment of the impact and significance of Ascii as a federal standard found that additional associated standards for Ascii were needed before its use could be fully effective. These two new standards are among those cited in the recommendation. None of the existing computer codes provide the flexibility and increased capabilities of Ascii as extended by these two new standards.

Fips 35 and 36 will be available from the Government Printing Office in June. Advance typed copies can be obtained from the NBS Office of ADP Standards Management, Institute for Computer Sciences and Technology, 20234.

COM Samples Free

NEW YORK – Users seeking to test computer output microfilm (COM) can now send a print tape to the Metropolitan Information Technology Center (MITC) here and receive a free sample of their data printed on microfiche.

No special programming is required. Users should send one tape (IBM, Burroughs or Univac) in standard print-image format (133-byte record length) blocked at 20 records (2,660 bytes) maximum to MITC, One Park Ave., 10016. Microfiche and tape will be sent back by return mail.

MITC is a design center, free to users, which is supported by manufacturers' exhibits.

COM Usage Widespread, Rising, Nationwide Survey Determines

CHICAGO – Of 122 companies not yet using computer output microfilm (COM) equipment for automated data storage and retrieval, nearly one-third, or 40 respondents, said they definitely plan to employ COM within the next six months.

So reported Bell & Howell's Business Equipment Group here in recently released findings of a nationwide research survey.

In all, DP managers at nearly 400 companies participated. About 100 said their companies currently used COM for payroll, accounts payable and inventory records among other diverse applications.

Of those who plan to replace paper printouts with COM in the near future, 40% will buy or lease the equipment while 60% intend to use an outside service bureau.

Of respondents not immediately considering COM, 41% confirmed that the cost or availability of DP output paper was becoming a problem for their company; the remaining 59% indicated this was not yet critical.

Interestingly, while current COM users averaged 30 microfilm readers each, a few extremes pulled up the figures: 87.6% use less than 10 readers, 10.8% use over 100 units and 1.3% use over 1,000, the company said.

Age of microfilm readers in use, however, was much more representative – one year, 11 months is the average with few dramatic departures. The oldest reported reader was installed six years ago, while the vast majority were installed within the last two years.

In all, respondents cited 41 brand-name readers currently used. Five leading reader manufacturers, however, account for 60% of all equipment, with the top manufacturer tallying 18 customers among those surveyed.

The next five leading manufacturers averaged but three customers each. The remaining 30 users have equipment supplied by 30 different reader manufacturers.

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Because all disk packs conform to certain industry standards, you might think they're all equal. They aren't. The important difference is the extent to which a manufacturer is willing to go in order to *exceed* industry standards. It's a matter of making a disk pack better than you really need, because there could be times when you need it. Let's look at a few superior points of the BASF 1236 disk pack:

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A polished performance

Following the coating operation, we use our own exclusive polishing process to achieve optimum surface regularity. We've been able to achieve a surface so flat that the possibility of a head crash being caused by uneven disks is completely eliminated. We might mention here that the coating and binder formulation, combined with coating and polishing techniques, all are important factors in achieving surface hardness, which is the ability of the coated surface to survive excessive or extended head loading.

Achieving balance

Like any rapidly rotating object, a disk pack will behave strangely if not perfectly balanced. In our precision balancing operation, any weighting required is screwed into place, which eliminates the potential of shifting inherent in a conventional adhesive weighting system.

And to make sure...

We test our 1236 disk packs to standards much tighter than those of the leading equipment supplier. If anything unpleasant should happen, we'd much prefer it happen here than on your drive. As a regular procedure, we do scratch tests to check coating thickness, impact tests to determine head crash resistance, detergent tests to check resistance to wear and temperature variations, and drop tests to make sure balance and alignment don't shift during shipment. We test to make sure our 1236 disk packs are error free.

Finally

Our 1236 costs no more than other twelve-high disk packs. You're already paying for BASF quality . . . you might as well have it. For more information on the 1236 or other BASF disk packs or cartridges, write to BASF Systems, Crosby Drive, Bedford, Massachusetts 01730.

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BASF

Chrysler Moves to Computer-Aided Design — Part 2

Distributed Mini Approach Protects Response Time

By Dennis M. Walker
Special to Computerworld

When Chrysler Corp. decided to implement an extensive, interactive computer-aided design (CAD) system, the company wanted to keep it separate from "number-crunching" jobs to protect response times.

The most flexible solution turned out to be a distributed processing approach, with a central mainframe linked to mini-computers at the user sites.

Chrysler Corp.'s Technical Computer Center had relied on two Control Data Corp. Cyber 70 computers which shared a half-million words of bulk core storage and more than one billion bits of disk storage.

Forty-eight access ports served approximately 110 time-sharing terminals (from Teletype Corp. ASR Model 33s to Tektronix 4010s), as well as five CDC remote-job-entry stations. Two CDC 1700s handled numerical control paper tape punching, analog-to-digital conversion and the CDC 777-1 large-screen graphics terminal installed in mid-1974.

The spectrum of hardware choices to support the planned interactive graphic system ranged from stand-alone systems to a single host computer supporting the required number of terminals.

Middle-Ground Approach

Chrysler's middle-ground approach consisted of a host computer interfaced to a series of programmable terminal controllers or minicomputers, which, in turn, interface to the graphic display devices.

A CDC Cyber 73/28 with 131K core storage and 500K of extended core storage was selected as the host computer. The primary terminal selected was the Imlac PDS-4 with its own 16K mini-computer.

Each terminal will be equipped with a data tablet and a hard-copy unit. In some cases, the hard-copy unit will be shared by multiple terminals.

The system also will be geared to support Tektronix 4010 and 4014 and CDC 777 terminals for some applications. Present plans call for a total of 25 terminals.

The desire for a centralized bulk data storage facility, along with the need to meet a heavy computational requirement, will be handled by the centrally located host computer. Display management, on the other hand, including scaling, view changing, display item identification, scissoring and menu generation — will be performed by the terminal controller.

By disconnecting the terminal controller from the host computer, given appropriate I/O peripherals, or by downloading from the host computer, the user can operate certain minimal computation applications in a stand-alone manner. Letting the terminal act as a funnel or using interface switching, the terminals can be operated in a standard time-sharing mode.

Rationale

Much of the rationale for Chrysler's decision to go with a large CDC host computer servicing many terminals was based on such software considerations as an available programming staff heavily oriented toward Fortran; the existing software packages running on CDC Cyber machines which link present CAD systems to available I/O devices (digitizers, plotters and drafting machines); and the need to use graphics in the structural analysis area as a preprocessor and post-processor for previously developed structural analysis software packages.

Also, much of what Chrysler plans to do in the four general application areas — CAD, structures, statistics, shape placement — has some large computational requirements, which could significantly affect total system costs, should all design stations have to meet these needs.

Over and above the basic configuration decision, the following major considerations should be noted.

- Point-to-point (plotter) terminals provide better resolution than faster scan devices and are more compatible with most existing software packages.
- Refresh tubes provide significantly more display flexibility, including rotation, selective erase and rapid menu changing, than stored tubes, but are generally more expensive, both in terms of the tube itself and the resources required to maintain the display (refresh cycles and local buffering).
- Large-size screens are important from two standpoints, including such user conveniences as less eye strain and more readable data in one frame and fewer required enlargements, which demand both computer processing and mantime.
- Hard-wired communications (or dedicated lines) provide significantly higher communications speeds, but not the placement flexibility of dial-up communications.
- An alphanumeric keyboard is generally a necessity. On the other hand, a function keyboard may be a frill that can be replaced with screen menus or tablet picking.

Software Considerations

Modular or structured programming is an absolute must if a programming team is to be effective. To truly assess software costs, one must include documentation, testing, maintenance and functional rewrites, as well as cost in system resources associated with large programs.

Probably the most critical software development area is that of data management. The maxim is simple: "Minimize access and transmission times, and, at the same time, minimize storage resource requirements." Implementation of this maxim is considerably more difficult.

The language approach of Concept has provided two additional pluses for Chrysler:

- If the output of the user's menu selections and key-ins is a language statement (even though this statement is not seen or constructed by the user directly), these statements, if saved during execution, can be used to effect checkpoint restarts.
- The language statements serve as a vehicle for rapid macro or application subprogram development.

In general, then, Chrysler has attempted to build an evolving CAD system, which takes advantage of existing software wherever possible.

Walker is manager, Engineering Systems Development Department, Technical Computer and Instrumentation Center, Chrysler Corp.

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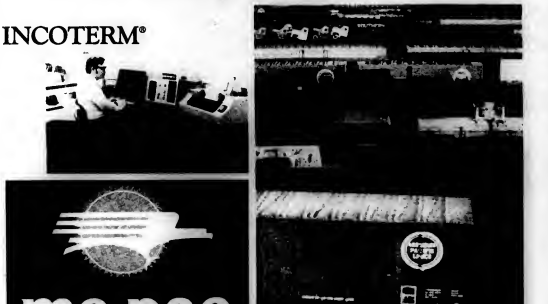

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It's called the 980A. And, it's packed with the features that helped ADDS carve a reputation in the Teletype® compatible market. Sharp, readable screen with upper and lower case character display. Line as well as character insert/delete. Not to mention blinking, formatting, and patented graphics.

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The 980A looks just like a 3270 to the telecommunications access method (BTAM, TCAM, etc.) and to such real time monitors as CICS. It can even operate on the same phone line as 3270's.

However, since your 3270's don't have blinking, lower case, graphics (or most other special 980A features, we might add), applications software developed to support the 3270 won't support our 980A. So we don't think we'll be replacing many of your 3270's.

But, the IBM user can develop new applications around the 980A. And the reason we think he should (here's where you get nervous again) is quite simple. The 980A offers unmatched features at an extremely low cost. Namely, $3200.00 to purchase, $90.00* a month to lease.

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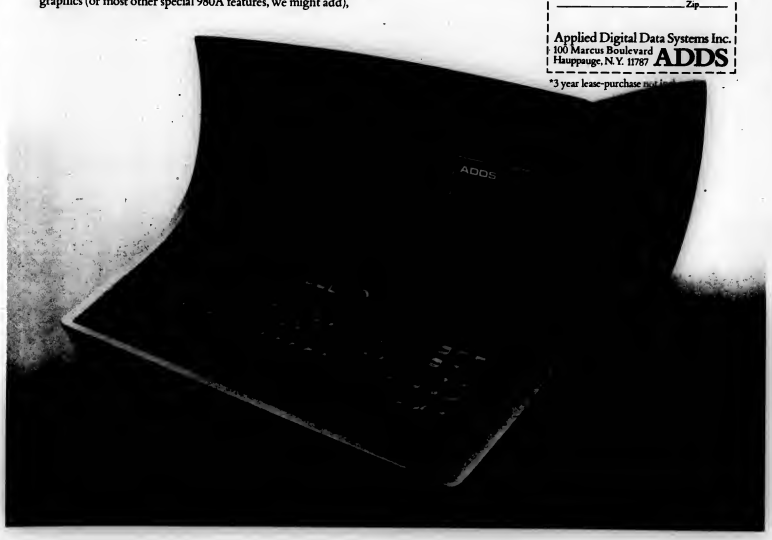

Road simulator at NEL tests the ride characteristics of vehicles by simulating road surface conditions. Data from strain gauges is converted to digital form for dynamic analysis by the laboratory's Univac 1108.

Structural Analysis Just One Job Of UK Laboratory's Large System

EAST KILBRIDE, Scotland – What's the road life of a new truck which will be produced by a major manufacturer in the UK? What are the stresses on an oil rig which is to drill in the North Sea, where it will be buffeted by wind and waves?

These and other problems are conquered with the help of a large computer at the National Engineering Laboratory (NEL), which is known for its R&D activities in mechanical engineering.

The laboratory makes its range of skills available to international clients. One key to its success is its use of a computer – in this case a Univac 1108 – in the quest for answers.

At the center, in a special dynamic analysis area, a truck wired with dozens of sensors is raised several feet off the ground with each wheel on a test stand.

"One of our main applications is computerized structural testing and dynamic analysis," Dr. J.H. Ludley, head of computer services, commented.

"In this case, we're subjecting the truck to vibration tests which will help determine its road life. Data from strain gauges on the vehicle is converted to digital form for processing by the 1108."

This type of testing is being expanded, he explained, with an advanced road simulator in which the 1108 uses mathematical models of the vehicles and data on road surface conditions.

Simultaneous Equations

NEL's structural analysis projects often involve processing thousands of simultaneous equations representing forces acting on a structure.

Ludley said a large computer is uniquely suited to solving these enormously complex problems, which are run either in the batch mode, conversational mode using a terminal or interactively with a display terminal and light pen.

The lab has a machine shop where a numerically controlled lathe connected to the computer by a high-speed line is being used to test a new numerical control program. NEL also uses this shop to produce parts for its own equipment.

"Numerical control was the reason we originally installed the 1108," Ludley said.

The laboratory is the official measuring facility for metering devices in the UK, supplying a British Calibration Service certificate with equipment it has tested.

It calibrates flowmeters by weight of water per unit of time. The 1108 reduces data from tests with 0 to 1.5 cubic meter/sec flow rates and up to 60,000 pounds of water.

Since it was installed in 1966, the 1108 has become an essential part of the laboratory's wide-ranging activity, Ludley said. He estimated about two-thirds of NEL's work involves a computer, and 40% of the work is "wholly dependent" on one.

NEL has developed supercavitating pumps, self-pressurized air bearings, cold forging machine tools and a rope-testing machine which can subject synthetic fibre and wire ropes to 100,000 foot pounds of force.

More On-Line Terminals

Ludley said he sees a trend toward more on-line terminals tied to the 1108 from remote locations. There are 50 such terminals at present, including 35 teletypewriter devices.

With a staff of over 950 people, about 40 of whom are in the Computer Services Division, NEL provides services including personal discussions with clients, special programming, assistance in interpreting results and a special room, with self-service card punch, which is set aside for visiting programmers.

The computer keeps a record of all work done and the time and facilities which were used. Each processing run includes this information on the last page of the output together with an estimate of cost.

The 1108 has 192K 36-bit words of core memory. Peripherals include six FH432 fixed-head drum units which can transfer information at 240 kword/sec, two Fastrand II drums with a total of 46M words of storage, two 600 card/min readers, six magnetic tape units and a 1,600 line/min printer. On-line storage is being enhanced with the addition of three 8440 disk subsystems.

Remote equipment, besides the teletypewriter devices, includes two displays with keyboards and light pens and an on-line 30-in. drum plotter.

Between 20 and 30 interactive jobs and half a dozen batch jobs may be active at the same time.

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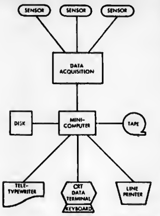

Typical Minicomputer Real-Time System

In Survey of Small Systems

Datapoint, DEC Machines Top List

By Patrick Ward
Of the CW Staff

DELRAN, N.J. – The Datapoint 2200 and the Digital Equipment Corp. Datasystem 300 made strong showings in a recent Datapro Research Corp. survey of small business computer users.

In general, the survey showed that most small business computer users like the overall performance, ease of programming, ease of operations and reliability of their equipment and the maintenance service they are receiving.

But users tended to be less satisfied with the technical support and manufacturer's software for their systems.

Datapro cautioned readers of its "All About Small Business Computers" report not to place undue emphasis on the ratings of 21 different computer systems, since the survey had responses from only 146 users with 258 installed systems.

Categories were scored on a scale from 1 to 4, with 1 being "poor" and 4 considered "excellent."

Overall Performance

The two Datapoint 2200 users in the survey gave their minis' overall performance an excellent rating. The two pairs of DEC Datasystem 300 and DEC PDP-11/40 users also rated their machines' overall performance excellent, as did the two users of the NCR 399 and the five users of the Wang 2200B.

Close behind came a 3.8 rating from the 32 Data General Nova users. The five IBM 1130 users gave their machines the same evaluation, while the seven IBM 360/20 users rated their minis only good.

The Datapoint 2200 users also rated their systems excellent in ease of programming, another general category in which small business system users seemed to be satisfied with their machines.

DEC's Datasystem 300 also won an excellent rating, but the company's PDP 11/40 slipped to a 3.5 here.

The two Basic/Four users and the four Burroughs B1700 users in the survey also gave their machines excellent marks in the ease-of-programming category.

The weighted average for all machines in this category was 3.3, but the Burroughs TC series with four users; the Data General Nova line; and the IBM 360/20 all came in below this with ratings of 3, as did Microdata's 1600 (two users) and the NCR 399 and Century Series, (two and four users).

Sweda's International Litton 1200 (three users) and the Burroughs L series (seven users) fell down here with ratings in the "fair" range.

Small business computer users also gave their machines high marks in the ease-of-operation category. No vendor's equipment had less than a score of good here,s and Burroughs B1700 and Olivetti's P603 (two users) won excellent ratings.

Ease of Conversion

Datapoints' 2200 and the DEC Datasystem 300 line both won excellent scores in the ease-of-conversion category, but there were few other high scorers in this group, whose rating average was only 2.9. DEC's PDP 11/40 had a flat 2 rating. So did the NCR 399.

Burroughs L and TC series; IBM's System 3 Model 6 (eight users) and 360 Model 20; the NCR Century Series and Sweda's 1200, Univac's 9200 and 9300 (four users) and the Wang 2200B all had somewhat higher "fair" ratings here.

Users gave their machines' hardware reliability higher marks. Basic/Four equipment and the Olivetti P603 won excellent ratings here, but Burroughs B1700 L and TC series were all in the fair category

(Continued on Page 34)

A Few Rules Help in Developing Monitoring and Control Systems

By Vic Farmer
Of the CW Staff

SAN FRANCISCO – The most difficult design task for implementing real-time monitoring and control systems that use minicomputers is to provide the computer programs needed to perform all system functions.

But there are several difficult design problems to overcome, and a few ground rules and goals will lead to successful systems, John H. O'Connell said in a paper presented recently at Compcon here.

A typical real-time monitoring and control system will include a data acquisition unit to monitor sensor points and output control signals; a mini to process the input; a CRT terminal to display system status and to enter commands to control functions; a printer and teletypewriter for hard-copy reports and messages; a disk for storing applications programs, reference data files and systems status; and a tape unit for permanent logging of system information.

Simple Queueing Technique

Because this typical system uses a small number of peripheral devices, a method for sharing these devices between application programs is needed, and, if the device is busy there must be techniques for queueing on the device, O'Connell, an engineering scientist for RCA, explained.

Of the many techniques for queueing, O'Connell recommended a simple technique. "Assume a device can be used only by a program that is in memory and executing. Therefore, several slots (memory spaces) are given a number from 0 to 15.

"Each slot corresponds to a bit in a 16-bit computer word. For each peripheral, there is a two-word table in which the first word contains a bit set if the device is busy and the second word contains several bit sets for programs waiting to use the device," he explained.

When the device is freed, the second word is scanned, starting at bit 0, to locate the next program that needs the device. The corresponding bit is then moved from the second word to the first, and that program is given control of the device.

This concept of a two-word queueing table can also be used for sharing common memory area and processing time, O'Connell added.

O'Connell warned there are two critical

(Continued on Page 34)

Varian V75 Gains Instruction Set Firmware

By a CW Staff Writer

IRVINE, Calif. – Following its course of progressive evolution in its V70 series of computers, Varian Data Machines has introduced its V75, which has some 32-bit functions.

The CPU's instruction set is a significant expansion of previous V70 computers, the firm said. New instructions operate on eight general-purpose registers and handle 8-, 16- and 32-bit operands. Dual memory buses allow I/O transfers at up to three million 32-bit word/sec. Up to 512K bytes of 330 nsec memory is accessible through 1K mapping and protection registers, Varian said.

V75 registers 0 and 1 and registers 4 and 5 together act as 32-bit registers with a complete set of register-memory arithmetic and logical operations.

Preliminary estimates indicate that the register-to-register operations will operate in 495 nsec in semiconductor or dual-port core memory and at 800 nsec in single-port core. Memory reference instructions will run at approximately memory speed. Detailed instruction execution times will be available in May, the company said.

The V75's Writable Control Store (WCS) is delivered with new firmware modules, including byte and stack manipulation and accelerated Fortran functions. Array indexing, parameter passing, loop termination, double precision integer, floating point compare and branch, square root and relational expression to logical value conversion operations are among the functions accelerated by use of the WCS.

Additions

The new Fortran IV compiler incorporates language additions and performance enhancements, both at execution and compile time. The language additions are consistent with IBM Level G Fortran. This will make the V75 look more attractive to an IBM user who intends to place a Fortran application on a minicomputer, in that the program conversion task will be easier, the firm said.

The additions include: random-access as opposed to sequential access to a record, entry at other than the beginning of a subroutine, generalized subscripts, literal enclosed in apostrophes, up to seven dimensions allowed for an array, labeled return statements, flexible I/O, initial data values in explicit specifications and formatted core-to-core transfers.

In place of slower Assembly language subroutines, the compiler also generates linkages to the fast firmware packages including:

- Array indexing.
- Parameter passing.
- DO Loop termination.
- Double precision integer operations.
- Floating point compare and branch.
- Square root.
- Conversion of relational expression to a logical value.

The new fast Fortran compiler is structured so as to have the capability of operating in overlays, with full compilation of reasonable-size programs possible in 8K of available core. This can benefit the user by requiring less core for the same background performance or better background performance during periods of high foreground activity, Varian said.

System prices range from $50,000 to $150,000 from the firm at 2722 Michelson Drive, 92664.

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 0 9 0 1  6 1 1 27 4 4 30 7 7 30 1 1 2  1 1 5 1 1 5  OCCURS 1 1 50 1   1 45 1   1 9 1 1   15  1
 1 A/N 9 0 NUM 5 6 ALF 2 3 A/N 2 3 A/N 0 0 ALF 0 0 NUM 0 1 C-3 4  2 2 A/N 7   2 A/N 6   7 C-1 7 7  C-2  8
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Small Business Systems Users Like DEC, Datapoint

(Continued from Page 33)

here. Univac's 9200 and 9300 made it to the high end of fair range with a 2.8 mark, but the average for the whole group was 3.2.

Maintenance service for the small business machines is in the good range (3.1) according to the Datapro survey. But, surprisingly, NCR's 399 and Olivetti's P603, and not the IBM equipment, had the highest user ratings in maintenance service.

NCR's Century Series, however, had only a 2.8 rating, the same as the Univac 9200 and 9300 figures. These scores, though, were a bit ahead of the 2.7 rating IBM 360/20 users gave maintenance service on their machines.

Burroughs' L series had the lowest score in the group with a flat 2.

Technical Support

Technical support had the lowest average user satisfaction rating of any category in the Datapro survey. Microdata's 1600 had a poor rating; NCR's Century Series had a 1.8 and Burroughs' L system was just ahead with a 1.9.

The highest mark in this category was the 3.5 rating from the two Olivetti P603 users, but the average rating for the category was only 2.4.

In rating their manufacturers' software, the Datapoint 2200 and DEC Datasystem 300 series users again put down "excellent" marks, while Basic/Four and Microdata 1600 users gave their vendors the poorest (1.5) ratings.

Burroughs' L series had a 1.9 rating, below the group average of 2.8.

"All About Small Business Computers," which has been reprinted from the March supplement to *Datapro 70*, also includes detailed comparison charts describing the characteristics and prices of 132 small business systems from 46 vendors.

The 43-page report costs $10 from the research firm at 1805 Underwood Blvd., 08075.

Synchro/Digital Capability Upped

BURLINGTON, Mass. – G&S Systems, Inc. has expanded its synchro-to-digital converter capability by providing a programmable interface for the Digital Equipment Corp. PDP-8S, F and M systems and has interfaces under development for most popular 16-bit minicomputer lines, it said.

The $1000 interface, called the GS-SD-8, has a mode switch added to the converter that allows a wide range of synchro and resolver input voltages to be used.

The firm is at 279 Cambridge St., 01803.

Rules Aid System Development

(Continued from Page 33)

processes that restrict the system response to an external event.

"The first is the times required to process an interrupt, and the second is disk-access time," he said.

Both of these times limit the rate at which the system can process information, he added. Interrupt processing time is primarily dependent upon the design of the computer hardware and the design of an efficient program that quickly decodes the interrupt.

The disk's access time, on the other hand, depends on whether a moving-head disk or a fixed-head disk is used, he said.

For a moving-head disk, the access time can be seven to 10 times longer, he cautioned.

Memory Usage

The most expensive part of a minicomputer is its memory, and its maximum size limits the number of resident functions and the speed of processing data, O'Connell said.

For a given system, "it may be difficult to get all the needed functions into available memory. To achieve optimum memory usage, the basic principle to follow is to keep in memory only those functions that are essential and used frequently," he advised.

Typical examples of functions which are needed in memory are interrupt service routines and routines that service application program requests for operating system functions. Infrequent usage occurs for routines that process errors and operating system functions concerned with file maintenance, he said.

Measuring System Performance

During system implementation, it is important to measure system performance to prove that design goals are being satisfied.

"Interrupt response time can be measured by connecting an oscilloscope to terminals on the computer back plane and observing the time interval from an interrupt to the response," O'Connell said.

"The time to generate an external control command can be measured by connecting an oscilloscope to control signals in the data acquisition hardware and observing the time from a point scanned to the generation of the output control command," he said.

Several counters are incremented in memory each time an event occurs. These counters may be sampled once per second by an application program that displays or prints their contents.

Programming Languages

"To reduce the programming effort, it is desirable to use higher level programming languages that more closely resemble English language statements and also generate several machine instructions for each statement," he said.

"Typical operating systems for available languages are not usually designed to handle real-time systems. Therefore, the user must design his own real-time operating system and use Assembly language for application programs. An alternative is to use a macro assembler in which the user defines his own higher level language that uses his operating system," he added.

"We have found that a macro assembler is efficient for macro statements that assemble into instructions that call a common subroutine. In addition, the common subroutine can be assembled with an application program by another macro statement.

This achieves a goal of reducing programmer effort and also reduces the debugging effort because the program consists of larger sections of fully debugged code," he concluded.

Ford improves dealers' parts control "Silent 700" data terminals

Recently, Ford Motor Company decided to upgrade the communications network used to communicate parts inventory and management accounting data between its Dearborn, Michigan Computer Center and the nationwide network of Ford and Lincoln-Mercury dealerships.

This network is a crucial part of two services that Ford offers to its dealerships . . . Automated Inventory Management (AIM) and Computerized Management Accounting (CMA). Dealers subscribing to these two services receive extensive parts inventory control reports and a wide spectrum of accounting and management information reports.

Striving to improve service to its dealers, Ford wanted more efficient data entry, simpler operating procedures, and greater accuracy than was offered by the existing mechanical teletypewriters. For this purpose, TI data terminals operating with fast, accurate magnetic tape cassettes offered the best alternative.

"Silent 700™ Automatic Send-Receive and Programmable Data Terminals from Texas Instruments provided the answers. According to a spokesman for Ford's Dealer Computer Services, "These terminals will provide major advancements through increased equipment reliability, data preparation efficiency, and improved data transmission integrity."

Improving man's effectiveness through electronics

Lower Cost in Near Future Aim of Floppy Developers

By David L. Stoddard
Special to Computerworld

It seems hard to believe, but the floppy disk as a commercial product is almost five years old. It was June of 1970 when IBM first introduced the floppy as a read-only program loader for its 3330 disk facility.

IBM's name for the drive, the Diskette, didn't sweep the industry, but the flexible disk drive itself did. Peripheral equipment manufacturers all over the country were quick to see the implications of this technology.

These implications, of course, went far beyond the use of the flexible disk drive as a program loader. With its combination of relatively fast access time, higher transfer rate and low cost, the flexible disk drive was a natural for a host of small-system applications, including small business systems of all kinds, intelligent and remote batch terminals, data entry equipment, word processing systems, control and test systems, programmable calculators, and minicomputer peripherals.

With this breadth of applications, there is an enormous number of potential uses for the flexible disk drive. Its most exciting possibilities appear to be not for the 100,000 or so companies that currently have business systems but for the 3 million companies that don't.

The flexible disk drive signals the beginning of a new approach to minicomputer systems – where the cost of peripherals is more in line with the cost of the mainframe.

It's not just that the floppy is a low-cost peripheral itself; it's also that this flexible device allows the systems designer to eliminate other peripherals from his system.

A single flexible disk drive can replace:

- High-speed paper tape equipment needed to load programs.
- A magnetic tape drive needed to communicate with a large computer system.
- A cartridge disk drive needed for on-line storage and retrieval of data files.

With this kind of potential, the race was on. In March of 1973, the Venture Development Corp. conducted a survey and found only six manufacturers of flexible disk drives – including IBM.

Less than a year later, the count was 15. Today, the number is probably double that. This includes manufacturers of both types of flexible disk drives, IBM-compatible and noncompatible.

What Now for Floppies?

Where is the flexible disk drive going from here? For the foreseeable future, the main thrust of all development is toward reducing costs without sacrificing reliability. To survive in this hotly competitive market, manufacturers of both drives and diskettes are going to have to concentrate on getting production costs down. Venture Development forecasts an OEM price of $325 by 1980, and I strongly suspect it will be less than that before 1980.

There is little opportunity for major technical breakthroughs occurring in this time frame. The big improvement needed – the development of the ceramic head – is behind us.

Floppies initially used stainless steel heads, and they created problems that stunted the growth of the flexible disk drive market.

Stainless steel heads were softer than ceramic; they abraded and particles became imbedded in them.

This caused irreversible disk wear and necessitated replacement of the heads. The ceramic head eliminated these problems and resulted in a more responsive head as well.

Capacity Increases Next

This doesn't mean there won't be substantial developments in flexible disk drives, but these developments primarily will be to reduce the cost to the user. Chief among these efforts will be increasing the storage capacity of the floppies. Capacities can be increased eight-fold within the foreseeable future.

The first step toward this capacity increase has already been taken. Pertec has doubled the bit density of the flexible disk drive by changing encoding techniques. Since that change doesn't significantly increase the manufacturing cost of either the drive or the cartridge, it has virtually doubled the cost/performance ratio of the floppy.

The next increase in capacity probably will result from recording on both sides of the diskette. This requires an improvement in the medium, since diskettes currently on the market are tested only on one side.

However, this improvement is already on the horizon. Information Terminals Corp. (ITC) is right now in the process of certifying its "flippy," which permits recording on both sides.

The drive manufacturers are sure to change their head arrangement to permit two-sided recording; it's not complicated. Thus, using both double-density encoding and two-sided recording, flexible disk capacity will be quadrupled.

The next doubling of capacity is somewhat further away. The track spacing can be reduced by 50%, thereby again doubling density. This step may, however, require improvement of the media to reduce coating imperfections and minimize absorption of moisture by the substrate. The electronic and electromechanical changes required are minimal.

Increasing the capacity four-fold or perhaps eight-fold shouldn't increase the access time either. The rev/min ratio should be capable of an increase from the present rate of 360 rev/min to perhaps 1,200 rev/min without major new development. Some drives already use d.c. motors, so an increase in rev/min is not a major change. Some head improvements and electronics costs will be involved, but the transfer rate of floppies could be increased from the current 250,000 bit/sec to 1 million bit/sec by 1976.

Diskette life, presently specified by IBM at 96 hours of head-to-disk contact time, will also increase substantially. The ceramic head alone has made that specification very conservative; for example, Pertec specifies 240 hours of actual head-to-disk contact time.

In addition, a mechanism to fully retract the head as well as the load pad away from the medium when it is not in use increases diskette life.

Substantial new efforts to increase the reliability of flexible disk drives are not likely in the near future. Newer drives have minimized the use of belts and pulleys and exhibit mean-time-between-failure (MTBF) rates of 4,000 hours or more.

Stoddard is program manager for the Flexible Disk Operation at Pertec's Peripheral Equipment Division.

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GA Adds Acquisition/Control Line for Industrial Use

ANAHEIM, Calif. – A family of mini-computer-based solutions for industrial data acquisition and batch or continuous control problems has been announced by General Automation, Inc. (GA).

Designated the Table-Oriented Process Information and Control systems (Topics), the family comprises off-the-shelf combinations of hardware and software that allow a user to configure and program a digital data acquisition/control system.

Topics ranges from data acquisition systems priced under $17,000 to disk-based systems for data acquisition and reduction for under $50,000 to high-performance control systems with floating-point hardware for under $60,000, the company said.

The key to the systems is software packages – PMS-16 Process Monitor System and DDC-16 Direct Digital Control – GA said. These relieve the user of operating system restrictions and housekeeping functions, "permitting him to concentrate on using his knowledge of his application to solve his problem without attending to detailed computer mechanics," GA said.

The user no longer has to develop his own method of scanning analog and digital inputs, converting sensor data to engineering units, writing programs to implement algorithms or providing output data to close the control loop. Topics provides all of these functions as basic building blocks – rather than restrictive language processing rules – that can be incorporated in the basic structure, GA added.

Both PMS-16 and DDC-16 utilize list-processing techniques. They use the same programs and subroutines, also called processors, for different tasks and functions under the direction of user generated task- and function-specific tables.

A support package consisting of a symbol compiler and configurator, also supplied, allows the user to select parameter names and simplify generation of system tables.

PMS-16 includes software processors that can schedule and scan analog and digital inputs, filter input data, linearize, calculate engineering units, test for alarm conditions, connect current values with specified parameter names, provide operator communications, produce system logs and trigger control operations, GA said.

DDC-16, which uses PMS-16 to provide a data base, adds control processors for supervisory and three-mode control algorithms, antiwindup algorithms, engineering unit to hardware conversion, output digital filtering and a framework for incorporating specialized control strategies for specific applications.

The company is at 1055 S. East St., 92805.

Sycor 250 CRTs Get Dual Floppy

ANN ARBOR, Mich. – Sycor has added a dual flexible disk option to its 250 series of IBM 3270-compatible CRTs.

Providing 500K characters of storage between them, the IBM-compatible diskettes allow users to key in data and then transmit it later, thereby reducing peak loads on communications lines and the central computer.

Diskette users can continue to key data during computer downtime or line outages, Sycor said. Unattended transmission from the mainframe to the diskettes for printing in the morning can also sidestep peak-period printing bottlenecks, the company added.

Storage of formats in the diskettes saves the CPU time in forwarding them and leaves lines open for other traffic, the firm noted.

The diskette option can be fitted to installed Sycor 250s. It adds $125/mo, including maintenance, to the $268/mo cost of a Sycor 255 stand-alone intelligent display system.

The firm is at 100 Phoenix Drive, 48104.

Data Cassette Holds 290K Characters

ROCHESTER, N.Y. – The Model 8420 data cassette from Techtran Industries, Inc. is a dual-tape unit with storage of 145K char./cassette and switch-selectable speeds of 110-, 300-, 1,200- and 2,400 bit/sec.

The unit also features mote control; fast forward mode; character edit feature; switch-selectable stop codes; program control from tape; full-duplex read/write operations; transparency mode; adjustable CR delay; 120 in./sec rewind; and connectors for both terminal and modem plug-in.

The 8420 is priced at $2,260 from the firm at 580 Jefferson Road, 14623.

Tape Recorder Militarized

COMPTON, Calif. – The ECR-10 militarized cartridge recorder from Genisco Technology Corp. uses a 1/2-in. tape in IBM-compatible formats to provide 47M bits of storage.

Genisco provides interfaces that make the ECR-10 look like either the Ampex ATM 13 digital magnetic tape recorder or the Univac 1840 data collector, the firm said.

The device costs $7,800 from 18435 Susana Road, 90221.

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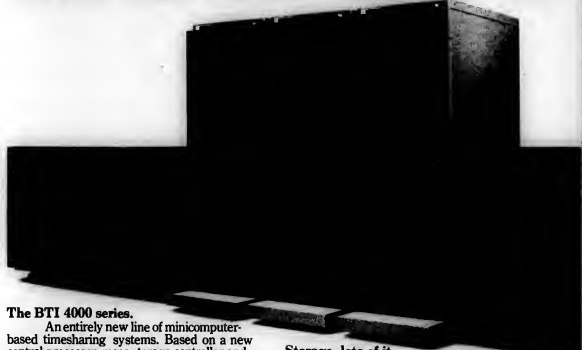

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A single 4000 system supports up to 32 concurrent users, with many new features for the system manager and user. But we didn't stop there. Up to eight 4000 systems can be "clustered" to allow sharing of central processor and disk storage facilities. That means as many as 256 users can access a clustered 4000 system—and to each user it looks like one system.

Start now. Grow later.

If 256 ports are too many for you right now, that's okay. Just start with a single system, or two, or exactly the number you want. And add more capacity as you need it.

BTI's 4000 system grows as you do—so you're never paying for more system than you want, or trying to get along with less system than you need.

Storage–lots of it.

Disk storage comes in 2.4 megabyte increments for smaller systems, and in 36 or 73 megabyte increments for the bigger applications. And if your needs are bigger yet, you can have almost 5 billion bytes of on-line storage on your 4000 system.

No hibernation.

You don't have to put a 4000 system to sleep to load or dump data, or to back-up your software. Selected portions or the complete contents of disk packs can be "mounted" or "dismounted" on-line. Files can be loaded from or dumped to magnetic tape—on-line. And a SNAP back-up allows you to copy the entire contents of a disk pack for safekeeping, with individual user activity suspended for a few minutes.

BASIC-X

The 4000's user language, a superset of BASIC, greatly extended for more user power in business and scientific applications. BASIC-X,

HP Has 15M-Byte Moving-Head Disk

PALO ALTO, Calif. – A moving-head cartridge disk drive, Model 7905A from Hewlett-Packard (HP), has a formatter that makes interface to any processor easy and provides for error correction, multiprocessor access and automatic macro I/O operations, HP said.

The rack-mountable disk is 10-1/2-in. high including power supply.

Usable data capacity is 10M bytes in the front-loading cartridge and 5M bytes on the resident disk. Seek time for the 7905A is 5 msec track-to-track, 25 msec average.

Average latency is 8-1/3 msec. Data transfer rate is 7.5M bit/sec.

Interfacing the 7905A to a minicomputer is through a microprocessor-based formatter, the HP Model 13037. It offers a simplified interface to the CPU and includes error correction, multiaccess from as many as eight CPUs and automatic macro I/O operations for reducing overhead in the central processor, HP said.

The 7905 disk drive and the 13037 controller are being offered together as Discu/15 for $8,400. Additional drives are $5,900.

First customer deliveries of production units are expected in May. The subsystem will be incorporated by mid-1975 into HP computer systems of both the 21MX and 3000 series.

HP is at 1501 Page Mill Road, 94304.

Graf/Pens Available

SOUTHPORT, Conn. – Science Accessories Corp. now has a rental program for its Model GP-2 Graf/Pen sonic digitizer. The $160/mo rental rate has a minimum period of three months.

The company is at Kings Highway West, 06490.

Miniworld Products

MDB-11B DMA Controller Interfaces PDP-11 Unibus, Users' Peripherals

ORANGE, Calif. – The MDB-11B from MDS Systems, Inc. is a general-purpose, Direct Memory Access (DMA) controller that provides an interface between the Digital Equipment Corp. PDP-11 Unibus and a user's peripheral.

The MDB-11B fits into either the BB-11 or DD 11-A Peripheral Mounting Panel, requiring one of the four available slots. There is a maximum of only one bus load on the MDB-11B whereas the DR 11-B requires multiple bus loads.

In addition, the MDB-11B has provision for up to 12 positions of user-designed logic which can be expanded to 82 positions with one more slot, neither of which is available from DEC, the firm said.

Seven Sections

The controller consists of seven functional sections: Address Selection, Interrupt Control, Bus Master Control, Word Count Register, Bus Address Register, Data I/O and Command and Status Register Mechanization.

User input and output signals are TTL-compatible and are available on two 50-pin ribbon cable connectors located on the top center of the module. These connectors can be used for I/O cables to external devices or for interconnection between the MDB-11B and additional MDB-11WW wirewrap modules which have connectors in the same location.

Price for the MDB-11B is $850, versus $1,490 for the DR11-B, MDB said. The firm is at 981 N. Main St., 92667.

5M-, 10M-Byte Units Extend Diablo Drives

HAYWARD, Calif. – Diablo Systems, Inc. has added 5M- and 10M-byte models to its Series 20 line of low-cost fixed-disk drives. Both are designed to match the disk storage capacities of IBM's System/32, Diablo said.

Diablo has expanded its fixed-disk Series 20 line into a family of drives designated the Model 21, 24 and 28 which provide common spares and service availability. The Series 20 family now provides 2.5M-, 5M- and 10M-byte capacities respectively.

The drives are priced at around $2,000. Diablo is at 24500 Industrial Blvd., 94545.

TIMESHARING SYSTEM 256 USERS.

developed for BTI's 3000 series, now augmented for the 4000. BASIC-X has string arithmetic, providing extended precision for the accountant; a flexible file-handling structure with powerful features like non-interfering shared read/write access, and many other niceties that make the programmer's job easier and faster.

Uptime.

Because central processor and disk storage facilities can be deployed dynamically, you can pull a CPU or disk drive out of service for any reason, while maintaining system availability to all your users. Something to think about if your application can't tolerate any interruptions.

Fast, all-hours service.

24 hours a day, seven days a week, BTI service engineers are ready to help. Just call and tell us you have a problem. In minutes, a timeshare specialist can access and exercise your system over the telephone, just as if he were standing next to it. With the 4000's on-line diagnostic capability, all it takes is a phone call.

Available today.

Our new 4000 series multiprocessor systems aren't ideas waiting for an order to see if they'll work.

Systems are already being delivered. And they're available for a wide array of business, commercial and scientific applications. Like dealer inventory, entertainment ticketing, financial services, real estate transactions, word processing, engineering design, manufacturing control.

The 4000 system offers a high usership capacity for a low cost of ownership, and can be a big money-maker for commercial timesharing firms, a big money-saver for in-house systems.

Representative Prices

Ports	Mass Storage (Megabytes)	Price
16	5	$ 55,500
32	72	89,000
64	219	171,276
128	365	305,686
256	657	561,702

The BTI 4000 series Interactive Timesharing Systems. Call or write for details.

East: Cherry Hill, NJ (609) 795-2334
Midwest: Schaumburg, IL (312) 882-2111
West: Sunnyvale, CA (408) 733-1122

BASIC Timesharing

650 North Mary Avenue, Sunnyvale, CA 94086
See a 4000 at the Computer Caravan

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We've selected leading experts from around the country to give seminars on some of the most important topics on today's EDP scene. These seminars are current, practically oriented, and packed with detailed information. They will help you save time and money. And they can give you the information you need to increase your installation's efficiency. In an increasingly complex and fast-changing EDP world, these seminars are even more important to your company, your installation, and you. Here is our current seminar schedule:

Data Communications

Course #1010 –

Practical Data Communications Systems and Concepts

This course will give you the information you need to master the newest developments in Data Communications. Led by the nationally recognized teleprocessing consultant, Dr. Dixon Doll, the course covers recent changes in areas like SDLC, HiD-LoD, DDS, newly approved major revisions to WATS, and the impact of satellite carriers. This seminar runs two days, and total cost, including workbook, reference materials, luncheons and continental breakfasts is $350. Additional registrants from the same company qualify for a reduced rate of $300. Current schedule is as follows:

Chicago – Jun. 2-3
Orlando – Jul. 2-3
Washington, D. C. – Jun. 9-10

Course #1020 –

Advanced Teleprocessing Systems Analysis and Design

This course is a follow up to Course #1010, with special emphasis on problem solving techniques for minimizing operating costs in commercial data communications networks. Also led by Dr. Dixon Doll, the course covers procedures, approaches and algorithms for evaluating and cost optimizing network organizations.

This seminar runs three days, and total cost, including an extensive set of customized course materials, luncheons and continental breakfasts is $450. Additional registrants from the same company qualify for a reduced rate of $400. Current schedule is as follows:

Los Angeles – Jun. 16-18

Data Base Design

A practical approach to the design, implementation, and maintenance of data base systems.

Effective data base system design requires both a complete knowledge of the facilities provided by a data base package, and a basic understanding of the mechanisms which can be employed to construct data base systems. In fact, the former is of questionable value without the latter.

This course is a package independent examination of the techniques required for the design of effective data base systems. The topics covered include:

- *Effective Record Design*
- *Physical Storage Techniques*
- *Optimum File Organization and Indexing Techniques*
- *File Integration*
- *and much more.*

Given in association with Leo J. Cohen and Performance Development Corporation, this course reinforces the lecture material with workshops, in which attendees apply the techniques just learned, to practical problems.

You should attend this seminar if you are (or will be) involved in the design and/or implementation of a data base system and whether as a Data Base Designer, Planner or Analyst.

This course runs for 3 days and costs $350, including course materials, continental breakfasts and luncheons. Additional registrants from the same company qualify for a reduced rate of $300. Current schedule:

Chicago	Sheraton O'Hare Motel	May 12-14
New York	The Plaza	June 2-4

Legal Tools for Computer Contracting & Protection

A seminar that gives you the legal tools you need for effective negotiations, agreement drafting, warranties, security, tax planning and software protection.

The impact of the law is felt in virtually every aspect of the computer industry, and you need to know how to apply the legal rules in a positive way to increase you advantage in dealing with vendors that supply your installation. This course teaches you how to avoid the legal pitfalls that can be costly and embarrassing to you.

Under the personal instruction of Roy N. Freed, a nationally known lawyer, author, educator and expert in the field of Computer Law, you'll learn how to protect your interests in subject areas like these: Negotiations, Contracts, Warranties, Avoidance and resolution of disputes, Security, Fraud, Taxation, as well as Techniques in handling any transaction. And practical discussion and review of your own contracts is an added feature of this seminar.

You should attend this seminar if you are involved in contracting for the use of computers or computer services– whether as a Corporate Executive, DP Manager, Contract Administrator, Consultant, Inside Counsel, or as a Private Practitioner involved with clients who use computers. Cost for the entire 2½ day seminar, including continental breakfasts, luncheons, and complete resource materials is $325. Additional registrants from the same company are charged only $275. Current Schedule:

New York	St. Moritz	June 4-6
Atlanta	Stouffers Atlanta Inn	April 23-25

Performance Evaluation and Improvement

A seminar actually designed to save your installation money.

This course starts with a discussion of questions and specific problems attendees have about system performance at their own installation. Then step by step each attendee will learn the methodology necessary to understand the problems and implement the answers. The techniques presented at this seminar are in effect at numerous installations today, and have extended the life of one $/360 for more than two years – a savings, at last estimate, of more than $700,000 for one user.

Our course leader is Saul Stimler. His book, *Data Processing Systems: their performance, evaluation, measurement, and improvement*, will be an important part of the seminar. As well as case studies, topics that will be covered include:

- *Criteria for quantifying performance*
- *Pencil and paper analysis of a system*
- *Benchmarking techniques*
- *Realtime, batch, and interactive time sharing systems*

You should attend this seminar if you are a data processing professional or corporate executive whose responsibility it is to plan, benchmark, evaluate, or improve data processing systems.

Cost for the entire seminar, including continental breakfasts, luncheons, and all course materials (including a copy of Saul Stimler's book on the subject) is only $250. Current schedule:

New York	**Waldorf-Astoria**	**May 5-6**

FIRST TIME!

The EDP Seminar Series sponsored by COMPUTERWORLD

Key-to-Storage Systems

How to evaluate and optimize the various successors to keypunch equipment.

Data entry is a big problem – and a big headache – as every computer user knows. It is therefore a prime target for cost savings. This course is designed to help you in the practical aspects of selecting, installing, and making the best use of keyboard-to-storage systems. It is an expansion and an update of our successful key-disk seminar. Under discussion (including some user case studies) will be:

- Introduction to data entry concepts (keypunch, buffered keypunch, keypunch, key-disk and beyond . . .)
- Key-disk hardware and software
- Evaluating . . . and starting . . . key-disk systems
- Selecting and operating intelligent terminals, both key-to-cassette and key-to-floppy disk
- Key-disk as a remote batch terminal
- Supervisor functions, motivation
- Mixed Media systems
- Trends in Computer Data Entry

This seminar is lead by Lawrence Feldelman, President of Management Information Corporation, and one of America's leading experts on data entry. All participants will receive a copy of "Data Entry Today", Management Information Corporation's authoritative publication on every aspect of data entry, including a six month update of this continuing reference service.

You should attend this seminar if you are concerned with optimization of your data entry shop, and especially if you are considering or currently using key-to-storage systems more advanced than basic keypunch. Cost for the 3 day seminar is $350, including continental breakfasts, luncheons, and all course materials. Additional registrants from the same company are charged only $300.

New York	Waldorf Astoria	April 21-23
Chicago	Hyatt Regency O'Hare	June 9-11

To: Ed Bride, Vice President, Editorial Services, Computerworld
797 Washington Street, Newton, Mass. 02160

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NOTE: If time is short, you may reserve space at any seminar by calling collect. Call Miriam Ober at (617) 965-5800.

COMPUTER INDUSTRY

CI Notes

Honeywell Selling Plants

MINNEAPOLIS – Honeywell, Inc. is selling two of its manufacturing facilities, a subassembly plant in San Diego, Calif., and a sheet metal fabrication plant in Wabash, Ind.

Honeywell has agreed in principle to sell its Wabash plant and business to a group of local investors, most of whom are Honeywell employees.

The plant makes cabinets for terminals and other products for the commercial building industry. About half of the plant's annual $6 million in sales currently is Honeywell orders, a spokesman said.

The San Diego plant has been sold to Kyocera International, Inc., specialists in semiconductor packaging. This move was part of Honeywell's plan to consolidate manufacturing operations to correspond with production efficiencies in the Series 60 computer line, the firm said.

Plans call for continued operation at San Diego, with a reduction in the work force of about 100 employees by this summer.

CIA Moves to D.C. Area

ROSSLYN, Va. – In an effort to be closer to those with "the power to solve the problems the industry faces," the Computer Industry Association (CIA) has moved its headquarters to this Washington, D.C. suburb.

Established three years ago to battle IBM's "dominance and control" over the total environment of the DP industry, the CIA now has 46 corporate members that employ 65,000 people and have combined revenues in excess of $2 billion.

The CIA is now located at Suite 801, 1911 N. Ft. Myer Drive, 22209.

Supershorts

General Automation, Inc. has renewed an OEM agreement with Data Printer Corp. for the supply of medium-speed line printers.

– – –

Intel Corp. has formed a Components Division that will include memory and peripheral components as well as microprocessor product lines.

– – –

California Computer Products, Inc. (Calcomp) has received orders from Burroughs Corp. totaling more than $17 million for disk drive memory systems to be delivered over a three-year period.

– – –

The city of Allentown, Pa., took delivery of the first Univac 90/30 and the first IBM System/32 went to Midwest Industries, Inc. in Omaha, Neb., a building contractor.

– – –

Look for Wang Laboratories to unveil this week three self-contained processors designed and priced to compete with IBM's System/32 and Digital Equipment Corp.'s Datasystem 310, as well as a family of line printers.

– – –

Incoterm Corp. has named Chori Co. Ltd. of Osaka as distributor in Japan for its intelligent terminals.

– – –

Memorex Corp. has produced its 10,000th Model 651 (non-IBM-compatible) flexible disk file. The firm recently received a patent covering the file's basic architecture and access mechanism.

– – –

Dataroyal, Inc. in Nashua, N.H., has named Core of Hamburg, Germany as its European sales representative for the IPS label printer.

But 22% Annual Growth Rate Seen

PCM Problems Plague Peripherals Field

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK – Today the entire independent peripherals industry is suffering because of the problems of plug-compatible manufacturers (PCM), C.O. Mertz, vice-president of International Data Corp., said at a recent briefing here.

The independent peripherals market had revenues of $2.3 billion in 1974, he said, predicting a 22% to 23% expected growth rate over the next five years for that market segment.

"And I would add . . . this is a profitable industry," the research firm's vice-president said.

"Of 32 companies I investigated with profit figures available for their peripheral business, 23, or 72%, were profitable, with after-tax income ranging as high as 15% to 20% of revenues and most with profit margins greater than 4% and increasing," he stated.

But surprisingly in such a growing market, there seem to be few new or emerging companies – "certainly nothing comparable to the number of exciting new companies in 1970," Mertz said.

Entering the necessary times of 1975, there are few companies to be "shaken out" of the DP business because there has been little company formation activity, he said.

This also means, he predicted, that "five years from today there will be no success stories one will be able to point to and say, 'It started in the mid-1970s'."

'Industry Still Young'

But, he added, "the EDP industry is still young and still has opportunities for new ideas to turn into success stories," pointing out such opportunities have to be available in a $2.5 billion industry growing at better than 20% yearly.

"So the explanation I am left with is that the ideas are there, but the financing to get them off the ground is not," Mertz declared.

"Sources of equity financing and new venture capital have dried up to the entrepreneur interested in starting a peripherals venture," he said.

"In part this is because there is little of this money available; but I also believe part is because the sources of these funds think the minicomputer or other industry segments offer greater potential than peripherals.

"The entire peripherals industry has been tarnished by the problems of those companies marketing IBM plug-compatible products," Mertz added.

At the same time, he noted, the revenues of the plug-compatible part of the peripherals industry account for only 30% of the overall revenues of the peripherals industry and this market segment "is not an important factor in the projected growth of the industry."

1975 Packaged Software Sales Expected to Reach $400 Million

By Nancy French
Of the CW Staff

NEW CANAAN, Conn. – The U.S. market for packaged software in 1975 will reach more than $400 million, but this figure represents a slowdown in the growth rate of the packaged software and services market measured in 1973, according to a report from International Resource Development, Inc. (IRD) here.

But the $400 million figure pales in comparison with the estimated $7 billion in salaries users will pay programmers and systems analysts to create and maintain custom software, the report noted.

Entitled "Computer Services and Software Markets," the report is the result of a survey of a panel of 38 Fortune 1000 users of computer services and software and an analysis of input/output models – that is, the amounts users are spending and the amount of revenue suppliers are receiving for goods and services' based on figures published by the Department of Commerce.

Users surveyed predicted growth in the use of software packages and services would drop to about 5% to 10% this year, compared with a growth rate of 20% to 30% predicted and matched in 1971 and 1973.

While users agreed their spending would drop in relation to that of previous years, it would continue to increase slightly from year to year from this point on for local batch and remote batch services, interactive time-sharing local batch and remote batch services, interactive time-sharing services and performance evaluation.

Software of the standard systems and applications varieties, custom software services, third-party maintenance and computer leasing will also see increased user spending.

The report indicated DP service organizations will be hit hard by IBM's System/32. Small businesses that have depended on service companies for processing payroll and routine accounting will begin to do their own, the report said.

Major Changes

Major changes are taking place in the industry structure, the report said. In a detailed review of the market shares of 58 leading suppliers of computer services and software whose companies reported earnings, the study indicated substantial gains have been made recently by Computer Sciences Corp., Bradford Computer and Systems, Boeing Computer Services and Greyhound Computer Corp.

The report predicted that, if present earnings patterns hold, Automatic Data Processing, Electronic Data Systems and General Electric Information Systems – companies whose growth has not kept pace with that of their market sector – will lose a portion of their market share.

National CSS and Tymshare have been enjoying "spectacular growth," according to the report, with On-Line Systems, Rapidata and Comshare growing, but at a slower rate.

The economic recession is hitting custom software suppliers hardest, the report said, with commercial facilities management contracts dwindling.

Swiss Bank Slaps Suit on CDC; CDC Contemplating Countersuit

ZURICH, Switzerland – "CDC was not in a position to provide the services stipulated in the contract."

"In September 1974, Union Bank of Switzerland refused to continue with its obligations under the contract and Control Data AG was accordingly forced to withdraw therefrom."

Opening Round

Such differing views, as exemplified in statements by the Union Bank of Switzerland (UBS) and Control Data Corp., respectively, marked the opening round of

Memorex Proposes Settlement of Suits

SANTA CLARA, Calif. – Memorex Corp. has proposed a settlement of class action and other lawsuits which alleged the firm and others violated federal securities laws in 1970 and 1971.

While admitting no liability in connection with the suits of their settlement, "the best interests of the company will be served by disposing of this burdensome, expensive and protracted litigation," Robert C. Wilson, Memorex chairman, said.

$4 Million Payments

Terms of the proposed settlement call for payment to plaintiffs of about $4 million, $1 million of which will be provided by Memorex and the remainder from former officers, board members and auditors as well as the firm's controller.

The suits stemmed from a complaint field by the Securities and Exchange Commission in 1971 charging Memorex with making false and misleading statements in financial reports. The proposed settlement must be approved by present Memorex shareholders.

suits between the two parties.

UBS has filed an initial brief in the Commercial Courts of Zurich, which, CDC said, "appears to seek damages of $29.1 million, plus interest, and reserves the right to make additional demands and to file further complaints."

The brief was filed against Control Data AG, a consolidated subsidiary, and is being translated at CDC's Minneapolis headquarters.

CDC said it "intends to vigorously defend this action" and anticipates its Swiss subsidiary will file a counterclaim against UBS for breach of contract.

The dispute involves work on a contract for joint development of an integrated DP system for the bank.

UBS Statement

That UBS explained in a statement: "In September 1974 the Union Bank of Switzerland decided not to proceed with the integrated DP system which Control Data Corp. was to install for the Ubiaco project.

"Because of unsolved technical problems and serious delays on the part of CDC, the contractual partners had, in the summer of 1974, undertaken a joint audit of the progress of the project up to that time and of the prospects for fulfilling the terms of the contract.

"The report written in September 1974 by representatives of the two parties showed that, as regards both hardware and software, CDC was not in a position to provide the services stipulated in the contract," the bank said.

"Since the discussions with CDC for an agreed settlement did not produce a satisfactory result, the Union Bank of Switzerland started legal action for damages against CDC in mid-March 1975."

The bank made this statement, it said, "because CDC has issued a number of misleading statements."

Adapso Spring Conference To Discuss Services Future

MEXICO CITY – Future trends in the services industry will be discussed at the April 16-18 spring meeting here of the Association of Data Processing Service Organizations (Adapso).

The Software Industry Association sector has prepared an active program of panel sessions, in addition to the conference sessions with speakers focusing on topics ranging from "The Real Meaning of the IBM-Telex Decision" to "The Rest of 1975: Pussycat or Tiger?" and "The Future of Time-Sharing."

The opening session April 16 features a talk on "Quo Vadis the Computer Service Industry?" by Herb Seidman, project director of Quantum Sciences.

Dr. Donald Devine will speak on "Leadership Perspectives." Devine is from Devine and Sussex of Cincinnati.

Women in DP

Judith Lightfoot of the National Organization for Women and a senior technical representative for Management Science America will give her observations on "A Piece of the Pie: Women in the DP Industry."

David Hathaway, executive vice-president of G.A. Saxton Co., will assess the future of the capital market.

Other speakers will discuss "How to Cope With This Economy" and "We Have Met the Enemy and They Are Us."

Software Taxation

Among the topics to be examined at panel sessions are software taxation, international markets and IBM products and directions.

Marty Goetz, vice-president of Applied Data Research, will chair panels on antitrust issues and software protection.

Other sessions will focus on industry standards, privacy and security, government procurement; and issues of incremental marketing.

Larry Welke of International Computer Programs, Inc. is conference chairman.

For further information, contact Adapso at 210 Summit Ave., Montvale, N.J. 07645.

SIA to Publicize Software Field

MONTVALE, N.J. – Image building is part of a program initiated by the Software Industry Association (SIA), a sector of the Association of Data Processing Service Organizations (Adapso).

The effort is designed to publicize the independent software industry's contributions to the DP industry and to improve the marketing climate for software firms.

Survey

The program involves a survey of the software industry to pinpoint specific industry issues, determine program needs and identify avenues of potential sales growth and action priorities, according to David S. Willis, founder and director of SIA. Willis is executive vice-president of Computer Information Management Co. of Dallas.

AUSTRALIA

Authentic information is freely available WITHOUT CHARGE from the Australian Embassy in Washington, D.C. (202) 797-3000, and the Australian Consulate General in New York (212) 245-4000, San Francisco (415) 362-6160, Los Angeles (213) 380-4610 and Chicago (312) 329-1740.

DG Sees Big Market for Eclipses

SOUTHBORO, Mass. – The market for DP systems at the operational level within companies could be as large as the value of all DP systems shipped last year, observed Francis A. Rowe, director of product marketing for Data General Corp. (DG).

Data General's Eclipse C/300 is aimed at this specific market, he noted, which exists because of a large gap standing between the corporate computer center and the line-operating departments, he said.

The gap is perceived in terms of requirements and capabilities, depending on whether it is viewed from the operational department or the central DP center, he added.

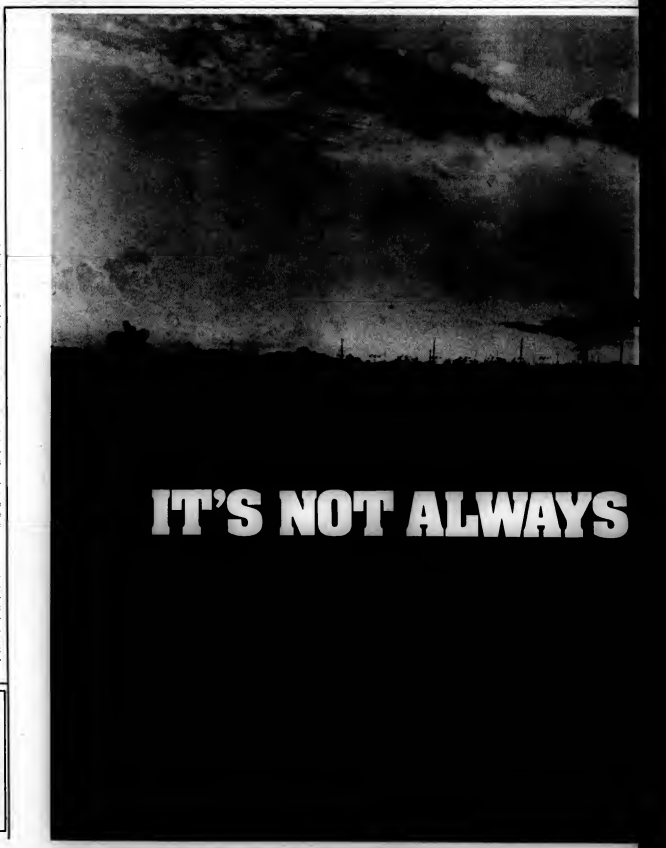
The line manager needs support during operations as well as before and after, when batch centers traditionally provide support, Rowe said.

DG does not believe the requirements and capabilities gap can be adequately bridged by stringing communications lines between still-larger central computers and small intelligent terminals, he said.

The Eclipse C/300 is designed to not only fill the gap between a firm's DP center and its operating departments, but to close it as well.

One advantage of a dedicated system, he noted, is that it is specifically configured to support the application's requirements.

When dealing with shared batch computers, frequently the application must conform to the configuration and operational characteristics of a shared batch computer, he noted.



Contracts

L.A. County Awards Total of $10 Million

LOS ANGELES – Two Los Angeles County departments have awarded contracts totaling about $10 million.

The County Department of Health Services has selected McDonnell Douglas Automation Co. to perform financial DP services for nine of its health care facilities. The award, for four years, is estimated at $8 million.

The County Sheriff's Department has awarded a contract valued at more than $2 million to Planning Research Corp. to develop a justice information system to coordinate the activities of law enforcement agencies in the county and speed communications.

Other Awards

Vertex Systems, Inc., a subsidiary of Management Assistance, Inc., has signed DP service contracts with Studebaker-Worthington Leasing Corp. and Wheelabrator Financial Corp.

To Link 260 Members Worldwide

System Selections Made for Bank Net

By Nancy French
of the cw staff

BRUSSELS, Belgium – The Society for Worldwide Interbank Financial Telecommunications (Swift) has completed its principal hardware and software selections for a communications network that will permit its 260 member banks to transfer funds internationally and facilitate other bank business.

Selected were the Burroughs model B774 communications processors, model B775 data concentrators and three companies' terminal systems for use as Swift Interface Devices (SID's) – three types of the Singer 1502 intelligent terminal, four different remote batch terminals based on General Automation's Spec 16 line and a Burroughs micrologic miniprocessor based on the B700 family of computers.

A software package designed by Singer's Business Machines Division will provide an interface between bank systems and concentrators.

A cooperative, nonprofit organization, Swift is establishing a worldwide communications network using terminals, concentrators and switching centers to link member banks in 13 European countries, the U.S. and Canada.

The system has been designed so any type of computer system can participate.

Two switching stations, one near The Hague, The Netherlands, and a second here, will use Burroughs B3700 mainframes.

Each message sent through the network will go from the originating bank via an SID remote data entry device to the switching centers where it will be fed to a B3700 mainframe fronted by the B774 communications processor. From there it will go to the concentrator in the receiving bank's nation to be transmitted to that bank's SID and then to that bank's computer system.

Capital Spending Up at Burroughs

DETROIT – Burroughs expects "good growth in revenue and earnings in 1975" and is budgeting an increase over 1974 R&D and capital expenditures.

Capital expenditures are expected to rise 8% over the $292 million in 1974 to a record $315 million, most of which will be for expanding the firm's rental equipment base, said Chairman Ray W. Macdonald.

The two-year total capital expenditures will exceed $600 million, he noted.

During 1975, expenditures will include $70 million for plant, tools, test equipment and marketing offices and $245 million for additions to the firm's rental equipment base.

"Burroughs has a very strong program for new products, and a significant portion of the $70 million will be devoted to tooling and test equipment for new products for all plants," Macdonald explained.

Burroughs plans to spend $95 million on R&D, which is above the $85 million budgeted for 1974 but below the more than $100 million forecast last October.

The reduction was due to the current uncertain condition of the economy, he explained.

Macdonald said he expects the first quarter report, due later this month, will also show good revenue and earnings.

DP shipments should rise about 20% over the record high level in 1974, he said, and President Paul S. Mirabito said he expects a 20% increase in manufacturing volume.

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9:00–9:45 Introduction and *Computerworld* Report
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11:15–11:30 Coffee Break
11:30–12:45 Workshops Repeated
1:00–2:00 Luncheon
2:15–3:00 Wrap-Up Panel

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Exposition and Forum: St. Paul Civic Center, I.A. O'Shaughnessy Plaza

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Pertec Specialist Advises

OEM Buyer Should Do Own Investigating

PALO ALTO, Calif. – Before making a deal with any supplier of mass storage devices, an OEM buyer should carefully evaluate the devices available to assure quality control, reliability and reasonable cost of ownership, Jerry Gaynor, senior disk product specialist for Pertec's Peripheral Equipment Division, said at a recent seminar here.

Reviewing data sheets and specifications and talking with sales engineers is not enough, Gaynor said. A visit to the supplier's factory is needed to see how the equipment is actually manufactured.

"You may find things that are not in keeping with your manufacturing philosophies, quality control standards or equipment testing requirements prior to shipment," he explained.

After visiting the supplier's facilities, the OEM buyer should run his own evaluation tests on the units that appear to meet his specifications, he said.

Attention should be focused on "data reliability, positioning reliability, interface requirements, access time and actual storage capacity," Gaynor said.

Don't Overlook Costs

Cost of ownership of the equipment should not be overlooked, he advised. "Obviously the purchase price is an important consideration, and it represents the biggest part of the cost by ownership.

"But there are other costs – both tangible and intangible – that should be studied before deciding on a unit with a lower initial purchase price," he cautioned.

One tangible consideration is spare parts commonality between various disk products.

Among the important intangibles Gaynor mentioned are the unit's power consumption and the amount of heat generated by the drive. Still another cost factor is installation.

Interface, too, is important should second sourcing be necessary.

Reliability is an important factor in the cost of ownership, Gaynor said. "You don't want to have 20% of the drives delivered to you defective," he explained.

"Also, frequency of repair and availability of the supplier's service and repair personnel are important. Once a unit is at your customer's facility, you don't want to lose his goodwill because of your supplier's faulty drive," he said.

Technical support, as well as applications support are also important factors, Gaynor said.

Gaynor also mentioned training and product documentation as criteria.

"When deciding on a disk drive supplier," Gaynor concluded, "you have to keep in mind you will be entering into a relatively long-term business arrangement with him. You should be convinced that he is a viable supplier and that he is actively exploring new and improved products that can benefit your systems."

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CORRECTION! CORRECTION!

In our January 29 issue we incorrectly printed the wrong dates for Cullinane seminars to be held at the Computer Caravan. Please note the correct days for the following seminars:

Day 2 — 2 p.m.
3 hours, all cities

IDMS
Management Overview – A system overview for management personnel including competitive features, costs, users and Cullinane Corporation background. Followed by:

Technical Presentation – In-depth presentation for technical personnel including IDMS, generalized communications interface, IDMS/CULPRIT, Data Dictionery, DBA utilities and comparison with other systems.

Day 3 — 9 a.m.
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Discussion of the use of EDP-AUDITOR/CULPRIT with IMS/TOTAL/IDMS, its special versions for banking (CIF/RMDSO), insurance (CFO/ALIS), and Manufacturing (BOMP/MRP) and a comparison with other audit and retrieval systems.

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Acquisitions

Anacomp, Inc. has agreed to acquire 80% of the outstanding shares of Electronic Data Preparation Corp. with a combination of cash and stock.

Burrough Corp. has acquired Graphic Sciences, Inc. for an exchange of shares at the rate of one Burroughs share to eight shares of Graphic Sciences.

Boeing Computer Services, Inc. has acquired Capital Cities Computer Centres Ltd., a British computer services company.

Automatic Data Processing, Inc. has acquired the payroll computer service business of First National City Bank of New York.

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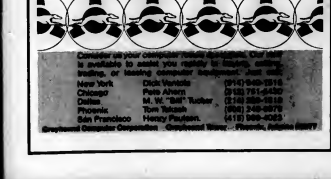

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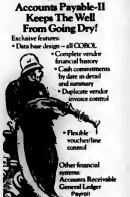

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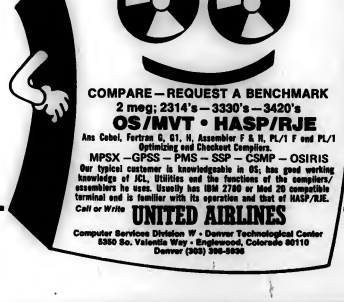

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Inforex Earnings Drop

Data Entry Makers' '74 Revenues Up

Two data entry makers, Inforex and Entrex, Inc., showed increased revenues for 1974, although different earnings patterns.

Although Inforex, Inc. had a strong fourth quarter compared with last year's results, higher interest expenses resulted in 1974 earnings of $401,000 or 15 cents a share compared with $1.4 million or 53 cents a share in 1973.

Interest expense for the year totaled nearly $2 million compared with $1 million last year.

Revenues for the year rose 38% to $52 million from $37.7 million last year. There was a 31% gain in revenue from rental and service during the year to $21.6 million from $16.5 million last year.

Reducing Sales to Leasing II

Inforex is reducing its sales to Leasing II to $655,000 from $6.4 million last year and increasing its outright sales to distributors overseas.

Sales to companies other than Leasing II rose to $28.5 million from $13.5 million last year.

Inforex also had a higher level of long-term lease activity than in 1973, President T.C. Cronin said.

Fourth-quarter results, unhindered by last year's $500,000 provision for loss on Keyscan, showed earnings of $237,000 or 9 cents a share compared with a loss of $1.1 million or 42 cents a share in the year-ago period.

Inforex revenues increased to $16.4 million from $10.5 million, of which $9.5 million came from sales to other than Leasing II compared with $3.8 million in the same period last year.

Rental and service revenues rose to $5.8 million from $4.8 million a year ago.

At Entrex, earnings were up for the year ended Dec. 31, with earnings of $812,000 compared with $509,000 in 1973, as the firm moved to retain increased ownership of equipment on lease.

Income before extraordinary items increased eight-fold to $429,000 compared with $61,000 in 1973.

Revenues grew to $22.7 million compared with $14.1 million in 1973.

"Sales and earnings for 1974 reflect reduced reliance on equipment sales to individual leasing companies," President Donald W. Feddersen said.

"The company retains a larger share of its new equipment placement in its own portfolio and thus records rental income as earned," he said.

"A major part of the 50% growth in gross assets in 1974" to $17.7 million from $11.6 million in 1973, "is directly attributable to the increased number of Entex-owned units placed on lease. Investment in leased equipment after depreciation more than doubled from 1973 to 1974," he added.

Sycor Reports Earnings, Revenues Increase for Year and Quarter

ANN ARBOR, Mich. – Sycor, Inc.'s earnings and revenues showed increases in the fourth quarter and year ended Dec. 31.

During the year, Sycor earned $5.1 million or $1.82 a share, including $1.8 million in tax credits compared with $2.5 million or 94 cents a share last year, when a $1.6 million tax credit was offset by a $2.1 million charge for cumulative effect of an accounting change.

Operating income was $3.2 million after tax this year compared with $2.9 million last year.

Revenues rose to $40.1 million from $31.7 million, with rental and service income nearly doubling to $14 million from $7.2 million last year.

Three-Month Earnings Up

During the quarter, the intelligent terminal maker earned $1.4 million or 49 cents a share, including a $374,500 tax credit, compared with $1.1 million or 43 cents a share in the year-ago period when there was a $183,000 tax credit.

Revenues for the three months rose to $10.7 million from $8.8 million in the same period last year. Again, rental and service income showed a sizable jump to $4.2 million from $2.6 million in the same period last year.

"Last year was a period of important progress for Sycor in terms of new product development, accelerated marketing efforts and increased financial stamina," President Samuel N. Irwin commented.

"During 1975, we anticipate that these strengths will provide the framework for continued growth. Engineering development efforts continue to focus on terminal devices geared to the environment of today's marketplace."

Decision Data 12-Month Results Show Improvement Over '73

HORSHAM, Pa. – Decision Data Computer Corp., which nearly doubled its 1974 shipments, reported much-improved results for the year ended Nov. 30, with revenues rising 220% and earnings replacing a loss.

The card-equipment maker earned $1.5 million or 39 cents a share, including $722,000 tax credit, compared with a loss of $886,000 or 25 cents a share in 1973.

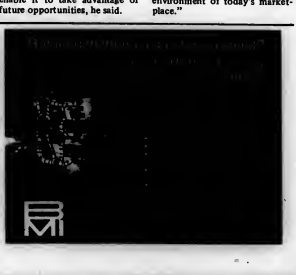
Revenues jumped to $40.6 million from $18.5 million last year.

During the quarter, earnings rose to $687,000 or 18 cents a share, about half of which stemmed from a tax credit, compared with $41,000 or 1 cent a share in 1973.

Quarterly revenues jumped 203% to $12.7 million compared with nearly $6.3 million last year.

Improvements in operations during the year included expansion of marketing and service organizations and the introduction of several new products, President Loren A. Schultz said.

Prices to both end users and OEM market were raised. The company is negotiating "substantial debt financing" for its leasing operations, which should enable it to take advantage of future opportunities, he said.



Earnings Reports

DATA DISC
Year Ended Jan. 3

	1975	1974
Shr Ernd	$.10	$.75
Revenue	9,982,534	10,385,594
Earnings	103,025	765,041
3 Mo Shr	.....	.17
Revenue	2,467,145	2,829,296
Earnings	(97,742)	166,295

BEEHIVE MEDICAL ELECTRONICS
Three Months Ended Dec. 31

	1974	1973
Shr Ernd	$.11	$.08
Revenue	2,123,507	1,335,129
Earnings	102,281	81,892

GENERAL AUTOMATION
Three Months Ended Feb. 1

	1875	1974
Shr Ernd	.....	$.37
Revenue	$14,021,000	14,122,000
Earnings	(2,057,000)	927,000
6 Mo Shr	.....	.72
Revenue	28,214,000	26,135,000
Earnings	(1,880,000)	1,821,000

TALLY
Year Ended Dec. 29

	1874	1873
Shr Ernd	$.01	.....
Revenue	17,784,000	$13,189,000
Spec Item	23,000	a844,000
Earnings	33,000	(3,761,000)

a-Debit; consists of cumulative effect on prior years of change in accounting principle less a $4,000 special credit.

INFOREX
Year Ended Dec. 29

	1974	1873
Shr Ernd	$.15	$.53
Revenue	51,985,000	37,661,000
Tax Cred	80,000	685,000
Earnings	401,000	1,442,000
3 Mo Shr	.09	.....
Revenue	16,352,000	10,518,000
Spec Item	a27,000	b512,000
Earnings	237,000	(1,130,000)

a-Tax-loss carryforward credit.
b-Debit; a reversal of earlier tax-loss carryforward credits.

MOHAWK DATA SCIENCES
Nine Months Ended Jan. 31

	1975 (000)	1974 (000)
Revenue	$125,597	$125,545
Loss Disc Op	a668	349
Loss	9,197	4,246

a-Includes $493,000 for operating losses during phase-out of operations of discontinued subsidiaries.

ON-LINE SYSTEMS
Three Months Ended Jan. 31

	1975	1974
Shr Ernd	$.35	$.46
Revenue	2,892,748	2,493,385
Earnings	289,006	409,292
9 Mo Shr	1.40	1.26
Revenue	9,033,530	6,859,297
Earnings	1,170,328	1,071,183

WYLY
Year Ended Dec. 31

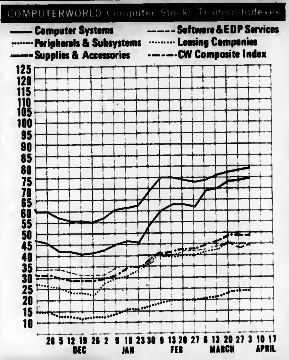
	1974	1973
Revenue	$80,369,000	$82,970,000
Disc Op	(12,168,000)	58,000
Spec Item	a1,642,000	b1,219,000
Loss	8,977,000	4,776,000

a-Tax-loss carryforward credit.
b-Debit; write-down of goodwill on marginal operation disposed of in 1973.

KEYDATA
Three Months Ended Jan. 31

	1975	a1974
Shr Ernd	$.04	$.03
Revenue	3,258,000	2,904,000
Tax Cred	46,000	41,000
Earnings	102,000	92,000
6 Mo Shr	.05	.13
Revenue	6,412,000	5,776,000
Tax Cred	61,000	171,000
Earnings	136,000	363,000

a-Restated.



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West Germany
Phone: (089) 690-70-52
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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, APRIL 2, 1975

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1974 RANGE (1)	CLOSE APR 2 1975	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	62-109	87 1/4	-1 1/2	-1.6
O	COMPUTER AUTOMATION	2- 18	6	- 3/8	-5.8
N	CONTROL DATA CORP	10- 38	15 1/4	- 3/8	-2.3
N	DATA GENERAL CORP	10- 38	24 1/8	+2 3/4	+12.8
O	DATAPOINT CORP	5- 15	14	0	0.0
O	DIGITAL COMP CONTROL	1- 5	1 1/2	+ 1/4	+20.0
N	DIGITAL EQUIPMENT	46-121	87 1/4	+3	+3.5
N	ELECTRONIC ASSOC.	1- 3	2 3/8	+ 1/4	+11.7
A	ELECTRONIC ENGINEER.	4- 11	7 3/8	+ 1/4	+3.5
N	FOXBORO	19- 48	28 1/2	- 1/2	-1.7
O	GENERAL AUTOMATION	6- 40	8 5/8	0	0.0
O	GRI COMPUTER CORP	1- 2	1/4	0	0.0
N	HEWLETT-PACKARD CO	54- 93	88 1/2	+1 1/8	+1.2
N	HONEYWELL INC	18- 86	29	-1 5/8	-5.3
N	IBM	152-251	203 3/4	-6 1/4	-2.9
O	MEMOREX	2- 5	4 1/2	0	0.0
O	MICRODATA CORP	1- 5	2 3/8	+ 1/8	+5.5
N	NCR	14- 40	28 3/4	+1 1/8	+4.3
N	PERKIN-ELMER	15- 40	27 1/2	+2	+7.8
N	RAYTHEON CO	21- 39	33	+ 1/8	+0.3
N	SPERRY RAND	24- 44	34 1/2	+1 1/4	+3.7
A	SYSTEMS ENG. LABS	1- 4	3	- 3/8	-11.1
O	ULTIMACC SYSTEMS INC	1- 2	3 1/2	+ 1/8	+3.7
N	VARIAN ASSOCIATES	6- 13	8 7/8	-1	-10.1
N	WANG LABS.	7- 20	12	- 1/8	-1.0
N	XEROX CORP	58-127	68 7/8	-1 3/8	-1.9

LEASING COMPANIES

EXCH		1974 RANGE (1)	CLOSE APR 2 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	COMDISCO INC	1- 7	2 5/8	+ 1/8	+5.0
A	COMMERCE GROUP CORP	2- 6	3 1/8	- 1/4	-7.4
A	COMPUTER INVSTRS GRP	8- 4	1	0	0.0
M	DATRONIC RENTAL	1- 1	5/8	0	0.0
A	DCL INC	0- 1	5/8	+ 1/8	+25.0
N	DPF INC	2- 5	4 1/8	- 1/8	-2.9
O	FPA RESOURCES	2- 3	2	0	0.0
A	GRANITE MGT	1- 3	3 1/4	+ 1/8	+4.0
A	GREYHOUND COMPUTER	2- 6	2 5/8	- 1/4	-8.6
A	ITEL	3- 6	5 5/8	0	0.0
N	LEASCO CORP	5- 12	6 3/4	+ 3/8	+5.8
O	LEASPAC CORP	1- 2	3/4	0	0.0
O	LECTRO MGT INC	1- 1	1/8	0	0.0
O	NRG INC	1- 5	1 3/8	-1	-42.1
A	PIONEER TEX CORP	2- 10	3 3/8	+ 7/8	+35.0
A	ROCKWOOD COMPUTER	0- 1	1/2	0	0.0
N	U.S. LEASING	5- 24	10 1/2	+ 3/8	+3.7

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
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SOFTWARE & EDP SERVICES

EXCH		1974 RANGE (1)	CLOSE APR 2 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	7/8	+ 1/8	+16.6
A	APPLIED DATA RES.	1- 10	1 5/8	0	0.0
N	AUTOMATIC DATA PROC	21- 57	47 1/8	- 7/8	-1.8
O	BRANDON APPLIED SYST	1- 1	1/8	0	0.0
O	CENTRAL DATA SYSTEMS	4- 6	3 1/4	0	0.0
O	COMPUTER DIMENSIONS	1- 3	2 5/8	+ 1/8	+5.0
O	COMP ELECTION SYSTMS	3- 4	4	- 1/8	-3.0
O	COMPUTER HORIZONS	1- 5	3/4	0	0.0
O	COMPUTER NETWORK	1- 2	1 3/8	0	0.0
N	COMPUTER SCIENCES	2- 4	3 3/4	+ 1/8	+3.4
O	COMPUTER TASK GROUP	1- 1	1/2	0	0.0
O	COMPUTER USAGE	2- 4	2 5/8	- 1/8	-4.5
O	COMSHARE	2- 4	3 3/8	+ 1/8	+3.8
O	DATATAB	1- 3	1	0	0.0
A	ELECT COMP PROG	1- 1	1/4	0	0.0
N	ELECTRONIC DATA SYS.	11- 25	16 1/4	+2 1/8	+15.0
O	INFONATIONAL INC	1- 2	1/8	0	0.0
O	IRS COMPUTER MARKET.	1- 1	3/8	0	0.0
O	KEANE ASSOCIATES	2- 4	1 3/4	0	0.0
O	KEYDATA CORP	1- 6	3	- 1/4	-7.8
O	LOGICON	2- 5	4 1/4	0	0.0
A	MANAGEMENT DATA	1- 2	2 1/4	+ 1/4	+12.5
O	NATIONAL CSS INC	5- 37	7 1/4	0	0.0
O	NATIONAL COMPUTER CO	1- 1	1/4	0	0.0
A	ON LINE SYSTEMS INC	9- 30	8 1/2	- 1/8	-1.4
N	PLANNING RESEARCH	2- 5	3 3/8	- 3/8	-10.0
O	PROGRAMMING & SYS	1- 1	3/4	+ 1/8	+20.0
O	RAPIDATA INC	1- 5	1 3/4	- 1/8	-6.8
O	SCIENTIFIC COMPUTERS	1- 1	1 1/8	0	0.0
O	SIMPLICITY COMPUTER	1- 1	1/4	0	0.0
O	TYMSHARE INC	6- 12	11 3/8	+1	+9.6
O	UNITED DATA CENTER	2- 4	2 7/8	0	0.0
A	URS SYSTEMS	2- 4	2 7/8	0	0.0
N	WYLY CORP	1- 5	3 1/2	+ 1/4	+7.6

PERIPHERALS & SUBSYSTEMS

EXCH		1974 RANGE (1)	CLOSE APR 2 1975	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	3- 11	6 1/4	- 1/4	-3.8
O	ADVANCED MEMORY SYS	1- 7	4	+ 1/8	+3.2
N	AMPEX CORP	2- 5	5	- 1/4	-4.7
O	ANDERSON JACOBSON	1- 4	2 1/4	+ 1/8	+5.8
O	BEEHIVE MEDICAL ELEC	1- 7	2 1/2	0	0.0
A	BOLT,BERANEK & NEW	5- 9	8 1/8	0	0.0
N	BUNKER-RAMO	3- 8	6 1/2	0	0.0
A	CALCOMP	4- 11	8 1/4	+ 3/8	+8.3
O	CAMBRIDGE MEMORIES	3- 16	3 7/8	0	0.0
N	CENTRONICS DATA COMP	7- 23	15	+ 3/8	+2.5
O	CODES CORP	8- 27	24	-2	-7.6
O	COGNITRONICS	1- 2	1/2	0	0.0
O	COMPUTER COMMUN.	1- 2	5/8	0	0.0
O	COMPUTER CONSOLES	2- 4	3 1/4	0	0.0
A	COMPUTER EQUIPMENT	1- 2	1 1/2	0	0.0
O	COMPUTER MACHINERY	1- 5	1 1/2	- 1/8	-7.6
O	COMPUTER TRANSCEIVER	1- 2	1 1/8	0	0.0
O	COMTEN	1- 5	3 1/4	+ 1/8	+4.0
N	CONRAC CORP	10- 22	16 5/8	- 1/8	-0.7
O	DATA ACCESS SYSTEMS	2- 3	2 1/4	0	0.0
O	DATA 100	4- 13	11 3/4	+1 5/8	+16.0
O	DATA PRODUCTS CORP	2- 5	3 7/8	- 1/8	-3.1
O	DATA TECHNOLOGY	1- 4	1 3/4	- 1/8	-6.6
O	DATUM INC	1- 4	1	- 1/4	-20.0
O	DECISION DATA COMPUT	3- 13	4 5/8	0	0.0
O	DELTA DATA SYSTEMS	1- 2	3/8	- 1/8	-25.0
O	DI/AN CONTROLS	1- 2	3/4	0	0.0
N	ELECTRONIC M & R	1- 4	2	0	0.0
O	FABRI-TEK	1- 3	1	0	0.0
O	GENERAL COMPUTER SYS	1- 4	1 1/2	0	0.0
N	HAZELTINE CORP	2- 7	3 1/2	+ 1/8	+3.7
N	HARRIS CORP	13- 34	19 1/4	- 1/8	-0.6
A	INCOTERM CORP	1- 6	3 1/2	- 1/4	-6.6
O	INFOREX INC	1- 5	3 1/4	- 1/8	-3.7
O	INFORMATION INTL INC	6- 14	10 5/8	0	0.0
A	LUNDY ELECTRONICS	3- 3	2 7/8	0	0.0
O	MANAGEMENT ASSIST	1- 1	1/2	+ 1/8	+33.3
A	MILGO ELECTRONICS	6- 18	11 5/8	- 3/8	-3.1
N	MOHAWK DATA SCI	1- 4	1 7/8	0	0.0
O	ODEC COMPUTER SYST.	1- 3	1	0	0.0
O	OPTICAL SCANNING	2- 6	2 1/2	0	0.0
O	PENTEC CORP	1- 6	5 3/8	0	0.0
A	POTTER INSTRUMENT	1- 5	1 3/4	0	0.0
O	PRECISION INST.	1- 3	3/4	0	0.0
O	QUANTOR CORP	2- 8	4 1/4	0	0.0
O	RECOGNITION EQUIP	2- 5	4 5/8	+ 1/2	+12.1
N	SANDERS ASSOCIATES	2- 8	5 1/2	+ 3/4	+15.7
O	SCAN DATA	1- 2	1 1/8	0	0.0
O	STORAGE TECHNOLOGY	8- 15	8 7/8	- 1/8	-1.3
O	SYCOR INC	4- 13	7	0	0.0
O	TALLY CORP.	1- 4	2 1/8	+ 1/2	+30.7
O	TEC INC	1- 7	2 1/2	0	0.0
N	TEKTRONIX INC	18- 48	29 3/4	+3 1/8	+11.7
N	TELEX	1- 4	2	0	0.0
O	WANGCO INC	3- 13	3 3/4	0	0.0
O	WILTEK INC	1- 8	2 1/4	+ 1/4	+12.5

SUPPLIES & ACCESSORIES

EXCH		1974 RANGE (1)	CLOSE APR 2 1975	WEEK NET CHNGE	WEEK PCT CHNGE
O	BALTIMORE BUS FORMS	4- 6	5 1/4	+ 1/4	+5.0
A	BARRY WRIGHT	4- 7	5 1/2	- 1/4	-4.3
O	CYBERMATICS INC	1- 2	5/8	0	0.0
A	DATA DOCUMENTS	23- 54	38	-1	-2.5
O	DUPLEX PRODUCTS INC	6- 22	19 1/2	+ 3/8	+1.9
N	ENNIS BUS. FORMS	4- 7	6 3/8	+ 3/8	+6.2
O	GRAHAM MAGNETICS	5- 11	8	- 3/4	-8.5
O	GRAPHIC CONTROLS	6- 15	15	+1	+7.1
N	3M COMPANY	43- 79	55 1/2	-1	-1.9
O	MOORE CORP LTD	33- 57	45	+1 1/2	+3.4
N	NASHUA CORP	15- 45	17 3/8	+ 1/2	+2.9
O	REYNOLDS & REYNOLD	6- 35	19	0	0.0
O	STANDARD REGISTER	10- 17	16 1/2	+1	+6.4
O	TAB PRODUCTS CO	4- 11	7	+1	+16.6
N	VARCO	13- 23	17 5/8	0	0.0
O	VANIER GRAPHICS CORP	3- 5	4 3/4	+ 1/2	+11.7
A	WABASH MAGNETICS	3- 7	4	- 1/8	-3.0
N	WALLACE BUS FORMS	14- 24	20 7/8	+ 3/8	+1.8

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